BULLETIN OF MISCELLANEOUS INFORMATION No. 7, 1937
ROYAL BOTANIC GARDENS, KEW

XXXVIII—THE ARBORESCENT SENECIOS OF THE CHERANGANI RANGE, WITH SUPPLEMENTARY NOTES ON MT. ELGON SPECIES.

A. D. Cotton and R. A. Blakelock.

In 1932 a paper was published in the Kew Bulletin giving a full account, as far as the facts were then known, of the arborescent Senecios of Mt. Elgon. Since that date a large amount of further material from Mt. Elgon has been received at Kew, and an extensive series of specimens collected by Dr. G. Taylor and Mr. P. M. Synge during the British Museum Expedition to East Africa of 1934–35, has enriched the herbarium of the Natural History Museum. From the study of these collections it has been possible to amplify the previous account of the Mt. Elgon species, and to distinguish a remarkable new form of the plant described in 1932 as *S. Gardneri*.

In addition to the material collected on Mt. Elgon, some very interesting collections have been received from a range lying some 50 miles to the east which had not been previously investigated by botanists. The range in question is that of the Cherangani Hills, which were first explored botanically by Mrs. B. P. Powles, and were later visited on four occasions by Mr. I. R. Dale, an Officer in the Kenya Forestry Department.

The industrious collecting on the various East African mountains during the past 5 years has made it clear that, for practical purposes, all the Senecio species existing on the main mountain massives have been discovered and that they can be assigned to a fairly definite series of species. There remain, however, several smaller summits and minor ranges which have not been explored, and it is obvious that, before a complete taxonomic account of the tree Senecios can be presented, these minor ranges and summits should be investigated.

The following mountains come under this category, the altitudes given being taken from the War Office maps :—

Mountains	*Alt. in. ft.*	*Approximate Position*	*Notes.*
Cherangani Hills ...	10,000–11,500	c. 60 miles E. of Elgon	Tree Senecio present
Moroto	9,666	c.100 „ N. „	Tree Senecio absent (*fide* Eggeling)
Kachagalu ...	9,594	c. 90 „ N.N.E. „	Unexplored
Sekerr (Mtelo) ...	10,873	c. 70 „ N.E. „	Unexplored
Kadam (Debasien)	9,866–10,016	c. 50 „ N. „	Tree Senecio absent (*fide* Eggeling)
Mau	10,000–11,500	c. 60 „ W. of Aberdares	Tree Senecio absent (*fide* Gardner)
Ngoro-Ngoro ...	10,000–11,500	c.110 „ W. of Kilimanjaro	Tree Senecio absent (*fide* Burtt 1932)
Gelei	9,620	c. 90 „ W.N.W. of „	Unexplored
Ketumbeine ...	9,620	c. 80 „ W. „ „	Unexplored
Meru	14,902	c. 40 „ W. „ „	Tree Senecio present
Hanang	11,125	c.160 „ S.W. „ „	Tree Senecio absent (*fide* Burtt 1932)

Of the mountains listed material has been received only from Mt. Meru and the Cherangani Hills. Despite suitable altitudes an absence of tree Senecios is reported on Ngoro-Ngoro (Burtt *in litt.*). On Loolmalasin (in the eastern massive of the Ngoro-Ngoro) Burtt observed " vestiges of former great forests of *Hagenia abyssinica* and *Juniperus procera* which had been ravaged by fires which had swept up from the Masai grazing lands." He suggested that fires may have exterminated a Senecio belt which once crowned the summits, since *Lobelia Burttii* and *Helichrysum Newii* were present in the alpine zone, both of which are often associated with tree Senecios.

As explained in the present paper, specimens from the Cherangani Hills are allied to, but not identical with, the Mount Elgon species, and specimens from Mt. Meru closely resemble, but are not identical with, those found on Kilimanjaro. The study of the species from these outlying areas therefore promises to prove of unusual interest.

On account of the close affinity of the Cherangani species with those of Mt. Elgon, and the proximity of the range to that summit, the collections from both these areas are dealt with together. Treatment of the Mt. Meru species will be postponed until further material has been received.

The Cherangani Species

The only reference to the Cherangani Hills which has been traced in botanical literature is that in Humbert's paper, where Marakwet (Cherangani) is shown in a diagram of the distribution (3). No plants, however, are recorded from the range, and no reference is made to it in the text. The first collector to visit these mountains was Mrs. B. P. Powles of Kitale. She ascended the range in December 1933 and presented a collection of dried plants to Kew, including some specimens of a tree Senecio. This plant bore some resemblance to the two lower species which occur on Mt. Elgon, namely, *S. amblyphyllus* and *S. elgonensis*, but it differed in certain particulars

from both. It has now been fully investigated and is described below as a new species under the name *S. cheranganiensis.*

The Cherangani Hills have since been explored by Mr. I. R. Dale of the Kenya Forest Department, who paid a visit there in March 1934 and also in September 1934, January 1935 and June 1935, and from him a further series of specimens of the same species were obtained and also another and dwarfer species which Mr. Dale stated was distinct. His view as to this has been confirmed and the plant is dealt with below as a new species under the name *S. Dalei.*

Before describing these plants it may be interesting to give an account of the Cherangani Range, based on notes furnished by Mr. Dale.—" The so-called Cherangani Hills are situated in the west of Kenya, roughly 60 miles east of Mt. Elgon. Except for a small 'white' area of farmland on the west the hills are occupied by three tribes, the Cherangani on the west, the West Suk in the north, and the Marakwet in the remainder, which is by far the largest area.

" The hills, which are approximately 40 miles long, rise to the north east of the Uasin Basin plateau and spread out in a half open fan-shaped manner. To the observer on the ground the hills appear to be in parallel ridges. The highest peaks are over 11,000 ft. To the west the hills are bounded by the Trans-Nzoia and Moiben districts (about 6500 ft.). In the north the hills have a bastion formation and the land drops steeply to the West Suk plains (about 5000 ft.). In the east the land drops almost precipitously to the Kerio Valley (part of the Eastern Rift Valley) with an altitude of 4000 ft. and less. No rainfall measurements have ever been made on top of these hills but the fall is probably between 60 and 80 inches a year. The hills are very important owing to the numerous streams which rise thereon.

" The rocks, largely pegmatites, are much older than those of Mt. Elgon. Quartz outcrops are common, and a fair proportion of the hills have a thin layer of grass-covered soil overlying quartz. Northwards above 8500 ft. the forest changes into one dominated by Cedar (*Juniperus procera*). *Pittosporum abyssinicum, Cornus Volkensii, Hagenia abyssinica* and bamboo (*Arundinaria alpina*) are also present. Above 9500 ft. bamboo is usually dominant with occasional trees, the commonest of which is *Hagenia.* Steep, rocky eroded hillsides, 7000 to 9000 ft., usually support *Protea abyssinica, Lasiosiphon glaucus,* and *Faurea saligna* (and occasional plants of *F. speciosa* at 7500 ft.).

" About a third of the hills are grassland and are used for pasturing cattle and sheep. Below 9500 ft. in these areas the valleys are filled with forest, but at higher altitudes the forest becomes a mere fringe and eventually ceases. Above 10,000 ft. the open land bears moorland species, e.g., *Erica arborea, Stoebe kilimandscharica,* and *Philippia Johnstoni.*

" As far as I am aware the ' tree ' Senecios only occur in the northern half of the hills. The tall species, *S. cheranganiensis*, has a range of 8500 to 10,500 ft. In the north and north-west I have seen it along stream banks at 8500 ft., but it is not common. I have not seen it in swamps at this altitude. From 9000 to 10,000 ft. it occurs along streams or in swamps. Above 10,000 ft. the tree only grows in wet but well-drained situations, i.e., along streams, around springs and at swamp edges. Definite forests of Senecio such as occur on Ruwenzori are not found.

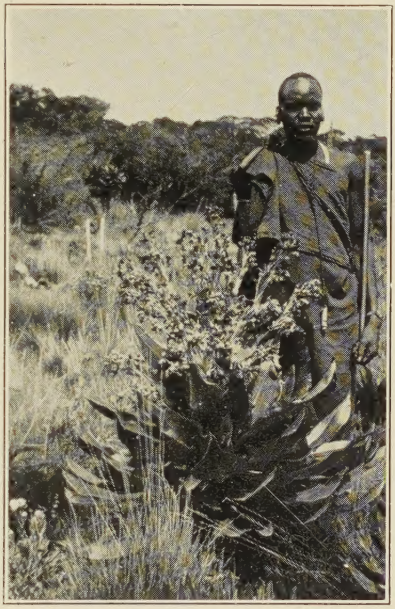
" The dwarf species —*Senecio Dalei*—occurs in swamps above 10,000 ft. and only, as far as I am aware, in the north-east of the hills. The flora of these is, except for the Senecio, entirely herbaceous and is largely composed of *Helichrysum* spp., *Alchemilla* spp. and *Lobelia aberdaricus*."

The following is a description of the two species referred to above, and, as will be seen from the remarks following *S. cheranganiensis*, it is possible that a third species is present on the range.

Senecio cheranganiensis *Cotton et Blakelock*, sp. nov. ; a *S. amblyphyllo* Cotton foliis angustioribus, lamina in petiolum sensim abeunte, disci floribus paucioribus differt.

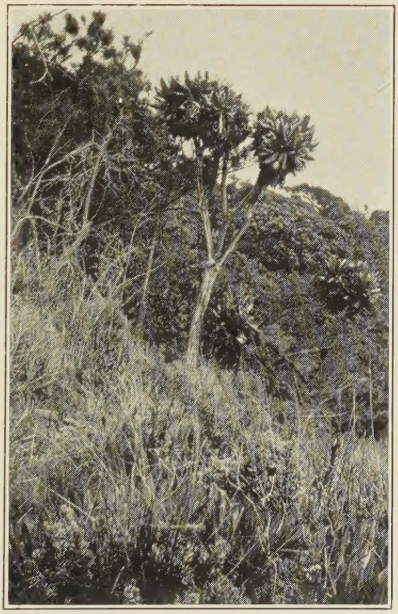
Arbor usque 9 m. alta. *Truncus* crassus, angulo acuto (c. 30°) semel vel bis ramosus, raro infra 2·5 m. ramosus, foliis marcescentibus vestitus. *Folia* tenuia vel subcrassa, lanceolata vel anguste lanceolata, apice acuta vel obtusa, dentata vel apice integra, lamina basi in petiolum sensim attenuata ; lamina 24·5–47 cm. longa, 7–13 cm. lata, supra glabra, infra crispato-pilosa vel glabra, costa praecipue basin versus pilosa demum glabrescente, nervis lateralibus angulo acuto vel fere 90° ortis 1·5–2·5 cm. inter se distantibus ; petiolus alatus, margine integro, 14–17 cm. longus, angustissima parte 1·5–2·5 cm. latus, supra basin longe pilosus. In plantis juvenilibus folia oblongo-elliptica, obtusa, usque 20·5 cm. longa, 6·5 cm. lata, infra glabra, costa pilosa vel glabrescente ; petiolus haud alatus, pilosus vel glabrescens, 18 cm. longus, 3 mm. latus. *Inflorescentia* c. 1 m. alta, bracteata, paniculata ; axis ramulique lanati ; bracteae foliosae, supra glabrescentes, infra sparse pubescentes vel glabrae, basi late alatae. *Capitula* subcampanulata, 1–1·5 cm. longa, 1·5–2 cm. lata (ligulis excl.). *Involucri bracteae* 3-seriatae : exteriores 8–12, lineares, ciliatae, circiter 12·5 mm. longae, 1 mm. latae ; interiores 10–13, 2-seriatae, anguste lanceolatae, acutissimae, 13–15 mm. longae, 2–4 mm. latae, virides. *Flores radii* 10–13, longe ligulati, flavi ; ligula 1·5–1·8 cm. longa, 3–4 mm. lata, tubo 6 mm. longo. *Flores disci* 35–46, tubo 8–9 mm. longo.

KENYA COLONY. Cherangani Hills. 9300–9500 ft., Dec. 1933, *Mrs. B. P. Powles* 37, 39, 40, 41, 43, 44, 45, 46, 47 ; source of Moyben River, 9000–9500 ft., March 1934, *I. R. Dale* 3210 ; near Pope's Nose, 8500 ft., January 1935, *I. R. Dale* 3392 (type) ; young plant, Kaisungal, 9200 ft., April 1935, *I. R. Dale* 3399. Wet situations from 8500–10,500 ft. in the northern half of the Hills, growing



Senecio Dalei at 10,000 ft., with *Lobelia aberdarica* in background.

Two plants of *Senecio cheranganiensis*. Man in between holding dead plant of *S. Dalei* (twice branched).



Senecio cheranganiensis, with *S. Dalei* in flower on the right (held up by man).

Photos: I. R. Dale.

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in small patches in the open or in forest glades, where it reaches its greatest size (Powles, Dale).

S. cheranganiensis (Plate XVI) is most nearly allied to *S. amblyphyllus* Cotton, of Mount Elgon, but it is distinct from this species in the narrower leaf with long attenuated base and lack of demarcation between lamina and petiole (fig. 1), and also in the smaller number of disc florets. In *S. amblyphyllus* the base of the leaf is cordate and there is a very distinct petiole. The new species differs from *S. elgonensis* Th. Fries most markedly in the much thinner texture of the leaf and to a less extent in its form.

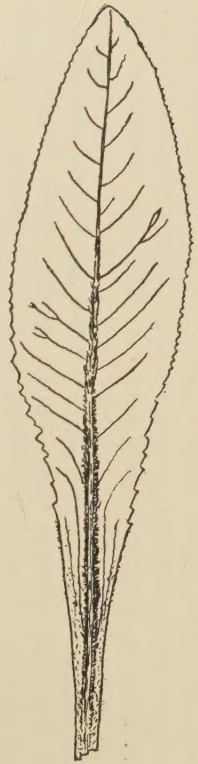
Mrs. Powles' gathering included a young plant showing pilose leaves. In these specimens the petiole was long, more or less distinct and unwinged. This juvenile condition does not apparently last long, as in a plant about a foot high collected by Mr. Dale (No. 3399) the leaves have a broadly winged petiole as in the adult form.

It should be added that another gathering from the Cherangani Hills represents a form intermediate between *S. amblyphyllus* and *S. cheranganiensis*. This specimen (*Dale* 3240) shows a wider leaf with an obtuse or rotundate apex similar to *S. amblyphyllus*, and differs from that species only in possessing a lamina merging into the petiole (figs. 2 and 4). The younger leaves of this same gathering resemble those of *S. cheranganiensis*. This plant is probably a variant of of *S. cheranganiensis* but until more material is available it appears inadvisable to include it under that species or to adjust the description to cover it.

Notwithstanding the existence of this intermediate specimen, the occurrence of so many gatherings showing the consistently narrow leaf and the decurrent lamina (characters in strong contrast to those obtaining in *S. amblyphyllus*) appears to provide sufficient reason for describing the dominant Cherangani plant as a distinct species. It certainly cannot be satisfactorily referred to either of the two lower Mt. Elgon species as at present understood.

Senecio Dalei *Cotton et Blakelock*, sp. nov. ; a *S. cheranganiensi* differt habitu nano, foliis crassioribus hirsutioribus minoribus, petiolo latiore, bracteis latioribus saepe acuminatis, floribus disci pluribus.

Planta c. 1 m. alta (inflorescentia excl.). *Truncus* lignosus, angulo obtuso (c. 50°) semel vel bis ramosus. *Folia* crassa, lanceolata, apice acuta vel rotundata, dentata, lamina in petiolum sensim attenuata ; lamina 17–28 cm. longa, 8–12 cm. lata, supra parce pilosa deinde glabra, infra dense pilosa demum glabrescens, costa barbato-tomentosa demum (praecipue apicem versus) glabrescente, nervis lateralibus a costa angulo acuto (c. 40°) ortis distinctis 1·5–2 cm. inter se distantibus ; petiolus late alatus, margine integro, 7–21 cm. longus, angustissima parte 2·2–3·5 cm. latus, infra pilosolanatus laminam versus, basin versus glaber, supra basin dense longeque pilosus. In plantis juvenilibus folia ut in adultis. *Inflorescentia* orbiculata, c. 60 cm. alta, bracteata, paniculata ; axis



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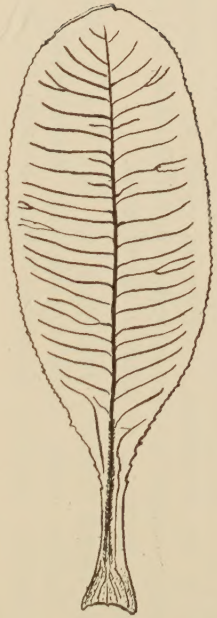

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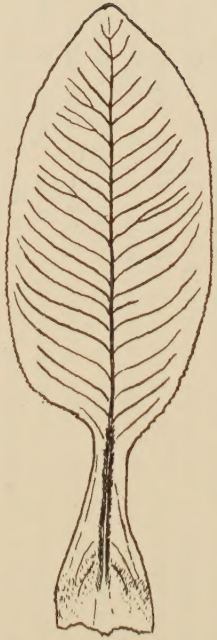

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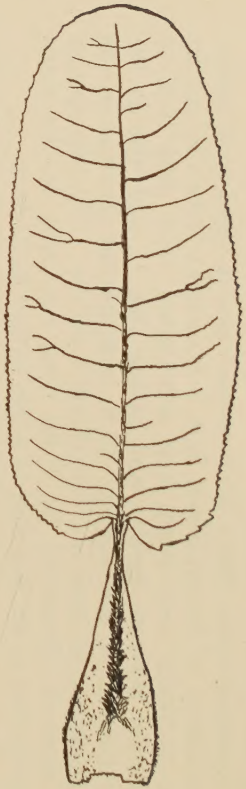

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Fig. 1. *Senecio cheranganiensis.*
Fig. 2. Intermediate form (*Dale* 3240).
Fig. 3. *S. elgonensis.*
Fig. 4. *S. amblyphyllus.*

ramulique lanati; bracteae foliosae, supra sparse pilosae, infra pilosae, basi late alatae. *Capitula* turbinata, pendula, longe pedunculata, 1·3–1·5 cm. longa, 1·5–2 cm. lata (ligulis excl.). *Involucri bracteae* 3-seriatae; exteriores 12–14, lineares, 7–13 mm. longae, 1 mm. latae, margine ciliatae; interiores 2-seriatae, c. 13, lanceolatae vel oblongae, apice acuminatae vel acutae, 11–13 mm. longae, 3–6 mm. latae, virides, apicem versus purpurascentes. *Flores radii* 12–13, longe ligulati, flavi; ligulae 1·5–1·8 mm. longae, 3–4 mm. latae, tubo 6–7 mm. longo. *Flores disci* 53–67, 8–9 mm. longi. *Achaenia* immatura glabra, 7–8-striata.

Kenya Colony. Cherangani Hills. 10,000 ft., Sept. 1934, *I. R. Dale* 3239; 10,000 ft., June 1935, *I. R. Dale* 3393 (type), 3394, 3398. In north-east part only, in swamps above 10,000 ft.

This species according to Mr. Dale is a dwarf plant not exceeding 3 ft. in height (Plate XVI) and is therefore of great interest as representing a species approximating in habit to the two species of the "cabbage" type (i.e., *S. Brassica* and *S. brassiciformis*). The leaves resemble in tomentum and venation those of *S. cheranganiensis* and not those of the cabbage type to which it is probably not closely related. The plant is principally distinguished from *S. cheranganiensis* by its dwarf habit, by its angle of branching and by the young leaves being more densely pilose below and possessing a slightly wider petiole. The inner involucral bracts, moreover, are wider and somewhat acuminate.

Mr. Dale gives the following statement with regard to the two Cherangani species:—"*S. Dalei* is a much shorter plant, but the most notable difference is the manner of branching. *S. cheranganiensis* often delays branching until it is 12 feet high, the branching is always acute, i.e. at about 30°, branching taking place to the third and possibly fourth degrees. Branching in *S. Dalei* may occur at 1 ft. from the ground, and the angle is obtuse, being about 50°. Branching occurs only once or twice. When *S. cheranganiensis* is growing in ill-drained swamps, growth is retarded and very occasionally specimens may branch at 4 feet but the angle of branching remains acute. The leaves of *S. Dalei* are smaller than those of *S. cheranganiensis*, and the habit of the rosette is much denser. As seen in the field the capitula of *S. Dalei* tend to be larger."

Mr. Dale notes that *S. Dalei* was in full bloom in June 1935, at which date no flowering specimen of *S. cheranganiensis* were seen. The leaves of the young plants (*Dale* 3394, 3398) do not differ in shape, petiole characters or type of indumentum from those of the mature plant.

The Mount Elgon Species

S. elgonensis *Th. Fries f.* This species has hitherto been collected well above the forest level, usually between 11,000 and 13,000 ft. Mr. Synge has, however, observed trees as low as 10,000 ft., just within the upper limits of the heath belt (*Synge* 887).

These specimens were of interest in showing slight modifications which occur when the species grows in semi-shade. They possessed a more lanky habit and had less marcescent foliage, and the leaves though typical in outline were quite as thin as those of *S. amblyphyllus*. In the other direction it is now known that occasional specimens are found higher than was formerly thought. Mr. Dale, indeed, identified a plant (No. 3142) at the summit of Kumukoi, namely, at 14,000 ft. The extreme range of *S. elgonensis* as at present known is from 10,000–13,200 ft. on the Uganda side of Mt. Elgon and from 10,500 14,000 ft. on the Kenya side.

The description of the leaf (fig. 3) of *S. elgonensis* given in the Kew Bulletin (1932, 470), and also the geographical distribution, may now be enlarged and emended as follows :—Leaf thick and coriaceous to fairly thick, thin if grown in semi-shade ; apex acute, subacute or rounded ; lateral veins arising usually at an acute angle rarely at an obtuse angle. Petiole fairly broadly winged, 10–18 cm. long, 2–5 cm. wide in narrowest part towards insertion, base wider 4–10 cm. wide ; midrib pilose or piloso-lanate on both surfaces ; wings pilose or becoming glabrous except towards the base on both surfaces. Disc florets 60–90.

Kenya Colony. Mt. Elgon. 12,000 ft., Dec. 1930, *E. J. and Mrs. C. Lugard* 437 ; 13,000 ft., Nov. 1931, *Capt. and Mrs. C. Lugard* 696 ; 11,000 ft., Feb. 1932, 699 ; 11,000 ft., Feb. 1932, *Tweedie* 113 (Nairobi Herb.) ; 10,500 ft., June (?) 1932, *Porter* 2732 ; 14,000 ft., July 1933, *Dale* 3142 ; 13,200 ft., Feb. 1935, *G. Taylor* 3768 ; 13,000 ft., Feb. 1935, 3720a ; 11,400 ft., Feb. 1935, 3759 ; 11,500 ft., March 1935, 3835a.

Uganda Protectorate. Mt. Elgon. Jan. 1918, *Dummer* 3382 (type) ; 1913, *Kmunke* (Mus. Vind.) ; Oct. 1916, *Snowden* 480 ; 11,500 ft., April 1930, *Liebenberg* 1609 ; 12,800 ft., Sept. 1932, *Thomas* 628, 630 ; 10,000–10,500 ft., Aug. 1934, *Synge* 887 ; 10,500 ft., Aug. 1934, 888 ; 11,000–13,000 ft., Aug. 1934, 921 ; 10,500 ft., 10,600 ft., May 1935, 1887, 1886.

S. amblyphyllus *Cotton*. This was described in 1932 from a single gathering. Now that further material has been received a fuller statement can be made as to the altitudinal range and the description can be amplified and amended. It is found that the species is not confined to the fringe of the forest as was thought, but that at times it occurs in the open. The leaves were distinguished from those of *S. elgonensis* by the much thinner texture, more oblong outline and blunt apex, and to a lesser extent by the venation. Although the leaf is constantly thin and much thinner than that of typical *S. elgonensis*, examination of the wealth of new specimens shows that there is no constant difference in leaf apex or venation, and that, as explained above, specimens of *S. elgonensis* from the forest fringe may possess leaves as thin as those of *S. amblyphyllus*. The cordate leaf base and the petiole narrowed at the insertion appear to be constant characters and to provide a ready means of

distinction between the two species. Thus, though the lowermost forms of *S. elgonensis* resemble certain forms of *S. amblyphyllus*, there still appears good ground for retaining the two plants as distinct species (fig. 4).

S. amblyphyllus is known to occur on the Uganda side of Mt. Elgon :—in marshy places in the bamboo forest (*Thomas* 655, *Synge* 853, 1081), and on the Kenya side :—in the heather forest zone (*Dale* 3211), and along stream sides above the forest limit up to 11,500 ft. (*Taylor* 3760, 3786, 3835). The leaf in the individuals growing at the higher altitudes is somewhat thicker than that of the forest forms but not so thick as in typical specimens of *S. elgonensis*. Mr. Synge states that it prefers open places in the forest and does not tolerate a great degree of shade.

A revised description of *S. amblyphyllus* is appended.

Tree up to about 8 m. high. *Trunk* woody, branched, covered above by marcescent foliage, branched at 5–18 ft. *Leaf* thin to fairly thick, oblong or oblong-elliptical, dentate, apex acute to rotundate, lamina cordate at base, petiole and midrib sometimes tinged with red or purple ; lamina 30–40 cm. long, 12–20 cm. wide, pilose above when young, glabrous when mature, below shortly and sparsely pilose, midrib arachnoid-tomentose pilose towards base glabrescent towards apex ; lateral nerves usually arising at an obtuse angle (often nearly a right angle) ; petiole narrow-winged near lamina broader towards base, 17–27 cm. long, 0·5–1·3 cm. wide at the narrowest part, 4–7 cm. wide at base, midrib pilose or pilose-lanate above and below, wings pilose below, glabrescent or pilose above, above at base of petiole long and densely pilose. In young plants leaves oblong-elliptical, dentate, apex obtuse, lamina pilose above and below, 18 cm. long, 8 cm. wide ; petiole unwinged, cylindrical, clothed with long dense hairs, 6·5 cm. long. *Inflorescence* about 1 m. high ; main axis and branches lanate ; leafy bracts oblong to elliptical with a broadly winged base, sparsely pilose below, sparsely pilose or glabrescent above. *Flower heads* subturbinate, c. 1·2–1·5 cm. long, c. 1·5–2 cm. wide (excl. rays). *Involucral bracts* 3-seriate ; outer 8–10, linear, lanate at margin, 6–10 mm. long, 1 mm. wide ; inner bracts 2-seriate, 13–15, narrowly lanceolate, acute, green, glabrous or glabrescent, 12–15 mm. long, 2–5 mm. wide. *Ray flowers* 10–14, long-ligulate, yellow ; ligule 14–20 mm. long, 3–4 mm. wide, tube 5–6 mm. long. *Disc flowers* 55–65, corolla 9–10 mm. long. *Achenes* striate, glabrous.

Kenya Colony. Mt. Elgon. Feb. (?) 1931, *Fairbairn* 2678 (type) ; 11,500 ft., Nov. 1932, *Tweedie* 14 ; 10,500 ft., Jan. 1934, *Dale* 3211 ; 11,500, 11,400, 11,200, 11,200 ft., Feb.–March 1935, *G. Taylor* 3835, 3760, 3785, 3786.

Uganda Protectorate. Mt. Elgon. 9100 ft., Sept. 1932, *Thomas* 655 ; 9500 ft., Nov. 1933, *Tothill* 2318 ; 9500 ft., Aug. 1934, *Synge* 853 ; c. 10,000 ft., Sept. 1934, *Synge* 1081.

S. Gardneri var. **ligulatus,** var. nov. A typo floribus radii ligulatis differt. *Habitus, folia,* et *inflorescentia* ut in *S. Gardneri*. *Involucri bracteae* 3-seriatae ; extimae 11, lineares, purpureae, lanatae (margine praecipue), 10–13 mm. longae, 1 mm. latae ; interiores 2-seriatae, purpureae, glabrescentes, lanceolatae, apice acutae, 14–15 mm. longae, 3–5 mm. latae. *Flores radii* 10, breviter ligulati, flavi ; ligula recurva, 4–5-nervi, 3–6-dentata, 5–6 mm. longa, 4 mm. lata ; tubus 6–8 mm. longus, leviter campanulatus ; staminodia 5, libera, 4 mm. longa. *Flores disci* c. 70, tubo 10 mm. longo, dentibus 1 mm. longo ; antherae 1 mm. exsertae. *Ovaria* striata, glabra, 3 mm. longa ; pappus 7–8 mm. longus.

Kenya Colony. Mt. Elgon. Feb. 1935, 13,800 ft., *G. Taylor* 3719.

Except for the presence of conspicuous ligulate florets this remarkable plant agrees with *S. Gardneri*, and is therefore described as a variety of that species. It was discovered by Dr. G. Taylor during the British Museum Expedition to East Africa, and was the only ligulate specimen observed among many hundreds of growing plants examined by him. No trace of such variation in *S. Gardneri* has been recorded by previous collectors nor is even a tendency in that direction exhibited by any of the specimens in herbaria. The discoid florets were somewhat fewer than in normal *S. Gardneri*, but this is regarded as a casual variation.

There are three possible explanations for the occasional presence of ligulate florets in a species such as this which is normally homogamous : (a) that, assuming the radiate flower to be primitive for the genus (as Hutchinson and others hold) and the homogamous flowers to be specialised for the conditions at high altitudes, the ligulate flower-heads represent the survival of a primitive character ; (b) that they arise as a gene mutation and (c) that the ligulate form is a hybrid between the normal plant and a ligulate species, in this case *S. elgonensis* Th. Fries which occurs with *S. Gardneri*.

The ligulate character is known to vary in several genera of *Compositae* but only one example appears to have been genetically studied, namely that of *Senecio vulgaris* L. In this Trow showed that the radiate character bred true and could be transferred to non-radiate forms by hybridization. Hybrid forms with ligules smaller than the normal were produced showing that neither factor was completely dominant (1).

In connection with the above discovery it may be noted that Hauman (4) refers to *S. Friesiorum* Mildbr., another homogamous species, as generally possessing only discoid capitula but occasionally producing ray florets with ligules only 3–4 mm. long and hidden by the involucral bracts. This has been confirmed at Kew, two specimens (*Humbert* 8934, *Hauman* 469) showing on dissection florets with very short rays and possessing staminodes. They also exhibit a type of corolla intermediate between the ligulate and tubular form. Intermediate florets of this nature have also been found in

the heterogamous species *S. adnivalis*, the small ray florets possessing staminodes in certain specimens.

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XXXIX—CONTRIBUTIONS TO THE FLORA OF SIAM: Additamentum XLIV.

Planchonella Kerrii *Fletcher* [Sapotaceae-Sideroxylinae]; *P. obovatae* (R. Br.) H. J. Lam affinis sed nervis lateralibus paucioribus, petiolis longioribus, inflorescentiis aureo- (nec ferrugineo-) tomentosis, filamentis antherisque subaequalibus differt.

Arbor circiter 30 m. alta (ex *Kerr*); ramuli parum crassi, teretes, primo pilosi mox glabri, cortice cinereo obtecti. *Folia* elliptica vel obovata, apice late obtusa, basi decurrentia, 15–20 cm. longa, 8–10 cm. lata, chartacea, supra brunnea viridi-tincta, subtus pallidiora, utrinque nitida, supra glabra, subtus ad costam primo pubescentia, mox glabra, costa supra conspicua subtus prominente, nervis lateralibus 8–10-paribus subtus valde prominulis angulo 50° e costa adscendentibus intra marginem arcuatis, nervis transversis numerosis parallelis, margine integra, petiolo 4 cm. longo glabro suffulta. *Inflorescentiae* in axillis foliorum vel praesertim eorum cicatricum positae, 4–10-florae; pedicelli 1·5–3 mm. longi, apice incrassati, aureo-tomentosi. *Sepala* late ovata vel rotundata, 2·5–3 mm. longa, extra sericeo-tomentosa, ciliata. *Corolla* 4–4·5 mm. longa, glabra; tubus 3 mm. longus; lobi 1·5–2 mm. longi, 1–1·5 mm. lati, apice truncati. *Stamina* 1·5 mm. longa, filamentis crassis 0·75 mm. longis, antheris sagittatis obtusis; staminodia lanceolata 1 mm. longa. *Ovarium* globosum, aureo-pilosum, 2·5 mm. diametro; stylus 2 mm. longus, glaber.

Krabi, Ao Luk, c. 100 m., evergreen on limestone hill, *Kerr* 19372.

Planchonella lenticellata *Fletcher* [Sapotaceae-Sideroxylinae]; *P. burmanicae* (Coll. et Hemsl.) H. J. Lam affinis sed fructibus magis acuminatis, foliis coriaceis, nervis lateralibus paucioribus, nervulis

supra impressis subtus obscuris differt ; nec non *P. assamicae* (C. B. Clarke) Fletcher* affinis sed foliis minoribus glabris pedicellis adpresse griseo-pubescentibus nec rubro-villosis differt.

Arbor circiter 5 m. alta (ex *Kerr*) ; ramuli obtuse quadrangulares, glabri, brunnei, rugosi, lenticellis numerosis et conspicue elevatis praediti. *Folia* elliptica, apice late obtusa vel rotundata, basi cuneata, 5–10 cm. longa, 2·5–5 cm. lata, coriacea, utrinque brunnea glabra, costa supra conspicua subtus prominente, nervis lateralibus 10–12-paribus, supra subconspicuis, subtus prominulis parallelis angulo 70° e costa adscendentibus intra marginem arcuatim junctis, nervulis supra firme impressis subtus obscuris, margine integra leviter recurva, petiolo circa 5 mm. longo glabro rugoso suffulta. *Inflorescentiae* in axillis foliorum vel praesertim eorum cicatricum positae, 1–2-florae ; pedicelli 4 mm. longi, adpresse pubescentes. *Sepala* ovata, 5 mm. longa, 3–4 mm. lata, crassa, leviter carinata, apice rotundata, intus et extra sericeo-pubescentia. *Corolla* circiter 7 mm. longa, glabra ; tubus 2–2·5 mm. longus ; lobi 4·5–5 mm. longi, 2·5 mm. lati, elliptici, apice rotundati. *Stamina* 4 mm. longa, filamentis 1 mm. longis, antheris sagittatis acuminatis ; staminodia late elliptica vel subrotundata, valde carinata, margine conspicue fimbriata, apice longe aristata. *Ovarium* ovoideum, 2 mm. diametro, aureo-pilosum ; stylus 8 mm. longus, glaber. *Fructus* ovatus, 3–3·5 cm. longus, 1·5–2 cm. latus, sparse adpresse pubescens vel glaber, 1–2-spermus.

Dio Chiengdao, c. 1300 m., open evergreen forest, *Kerr* 5335.

Planchonella punctata *Fletcher* [Sapotaceae-Sideroxylinae] ; *P. burmanicae* (Coll. et Hemsl.) H. J. Lam affinis sed foliis subtus minute punctatis recedit.

Arbor circiter 20 m. alta (ex *Kerr*) ; ramuli teretes vel obtuse quadrangulares, glabri, brunnei, rugosi, lenticellis numerosis et conspicue elevatis praediti. *Folia* elliptica, apice obtusa, basi cuneata, 8–15 cm. longa, 4–6·5 cm. lata, chartaceo-coriacea, utrinque brunnea glabra, subtus minute punctata, costa supra subconspicua subtus prominente, nervis lateralibus circa 10-paribus supra subconspicuis vel leviter impressis subtus prominulis parallelis angulo 55° e costa adscendentibus intra marginem arcuatim junctis, nervulis numerosis utrinque interdum obscuris, margine integra leviter recurva, petiolo circiter 10–15 mm. longo glabro supra complanato suffulta. *Inflorescentiae* imperfectae, in foliorum cicatricum axillis positae ; pedicelli circiter 7 mm. longi, adpresse pubescentes. *Sepala* ovata vel oblongo-ovata, 6 mm. longa, 3–4 mm. lata, crassa, leviter carinata, apice acuta vel obtusa, intus et extra sericeo-pubescentia. *Corolla* 8 mm. longa, glabra ; tubus 2·5–3 mm. longus ; lobi 5–5·5 mm. longi, oblongo-elliptici, apice rotundati vel late obtusi. *Stamina* 4 mm. longa, filamentis 2·5 mm. longis,

* **Planchonella assamica** (*C. B. Clarke*) *Fletcher*, comb. nov.—*Sideroxylon assamicum* C. B. Clarke in Hook. fil. Fl. Brit. Ind. **3**, 537 (1882).

antheris sagittatis acuminatis ; staminodia ovata, apice aristata, 5 mm. longa (arista inclusa), valde carinata. *Ovarium* conicum, 2 mm. latum, aureo-pilosum ; stylus 10 mm. longus.

Chiengmai, Samông, c. 600 m., mixed deciduous forest, *Kerr* 6392.

Planchonella sericea *Fletcher* [Sapotaceae-Sideroxylinae] ; *P. obovatae* (R. Br.) H. J. Lam affinis sed foliis magis obovatis apice obtuso-acuminatis subtus cinereo-sericeis, pedicellis aureo-sericeis nec ferrugineo-tomentosis differt.

Arbor circa 25 m. alta (ex *Kerr*) ; ramuli crassi, obtuse quadrangulares vel teretes, primo ferrugineo-pubescentes mox glabrescentes, cortice cinereo vel cinereo-brunneo obtecti. *Folia* obovata, apice obtuse acuminata, basi valde attenuata, in petiolum decurrentia, 10–15 cm. longa, 5–8 cm. lata, coriacea, supra brunnea subtus pallidiora, utrinque sericeo-pubescentia atque nitida, costa supra impressa subtus prominente, nervis lateralibus 10–12-paribus supra conspicuis subtus prominulis parallelis, angulo 50°–55° e costa adscendentibus intra marginem arcuatim junctis, nervis transversis irregularibus utrinque conspicuis, margine integra, petiolo 2–3 cm. longo supra canaliculato sericeo-pubescente suffulta. *Inflorescentiae* in axillis foliorum vel praesertim eorum cicatricum positae, 4–8-florae ; pedicelli circiter 5 mm. longi, striati, aureo-sericei, apice incrassati. *Flores* immaturi, alabastra elliptica, 2 mm. longa.

Pang-nga, Kao Katakwan, c. 100 m., evergreen forest, *Kerr* 18503.

In spite of the specimen being in flower-bud only, it is from foliage characters a very distinct species. The leaves are broadly obovate, strongly tapering at the base, obtusely acuminate at the apex and at first markedly sericeous on both surfaces but later only so below.

Planchonella siamensis *Fletcher* [Sapotaceae-Sideroxylinae] ; *P. maritimae* Pierre affinis, sed ramulis espinosis, foliis ellipticis nec obovatis differt.

Arbor circiter 12 m. alta (ex *Kerr*) ; ramuli teretes vel obtuse quadrangulares, glabri, cortice cinereo-brunneo obtecti. *Folia* elliptica, apice rotundata saepe apiculata, basi valde attenuata, in petiolum decurrentia, 4–5 cm. longa, 1–2 cm. lata, coriacea, utrinque brunnea, glabra, supra nitida, costa supra leviter impressa subtus valde prominente, nervis lateralibus 5–7-paribus supra conspicuis subtus subprominulis parallelis angulo 45° e costa adscendentibus, intra marginem arcuatim junctis, nervulis paucis irregularibus inconspicuis, margine integra leviter recurva, petiolo 3 mm. longo glabro suffulta. *Inflorescentiae* in axillis foliorum vel praesertim eorum cicatricum positae, 2–4-florae ; pedicelli 3–4 mm. longi, griseo-tomentosi. *Sepala* ovata, apice rotundata, 3–4 mm. longa, 2 mm. lata, intus et extra griseo-tomentosa. *Corolla* alba (ex

Kerr), 4·5–5 mm. longa ; tubus 1·5 mm. longus ; lobi lanceolati, 3–3·5 mm. longi, 1 mm. lati, apice rotundati. *Stamina* 4 mm. longa, filamentis 2·5 mm. longis, antheris sagittatis apiculatis ; staminodia lanceolata, 1 mm. lata, 3 mm. longa. *Ovarium* globosum, aureo-pilosum, 2 mm. diametro ; stylus 4 mm. longus, glaber.

Kanburi, c. 50 m., open scrub, *Kerr* 10124.

Palaquium Garrettii *Fletcher* [Sapotaceae-Palaquiinae] ; species *P. koratensi* Fletcher affinis, sed floribus paulo minoribus, staminibus numerosioribus, filamentis antherisque minoribus differt ; nec non *P. obovato* Engler affinis sed ovario sericeo-pubescente differt.

Arbor circiter 18 m. alta (ex *Garrett*) ; ramuli crassi, cicatricibus permultis foliorum inflorescentiarumque tecti, primo adpresse ferrugineo-puberuli mox glabrescentes, cortice brunneo obtecti. *Folia* ad ramulorum apices dispersa (ex *Garrett*), elliptica vel oblonga vel oblongo-lanceolata, apice rotundata vel late obtusa, basi cuneata, 10–20 cm. longa, 3·5–8 cm. lata, chartacea, utrinque brunnea, subtus pallidiora, glabra, costa supra leviter impressa subtus prominente, nervis lateralibus 12–16-paribus supra subconspicuis subtus prominulis angulo 45–60° e costa excurrentibus intra marginem arcuatis, nervis transversis numerosis irregularibus, margine integra, petiolo 1·5–2·5 cm. longo adpresse puberulo suffulta. *Inflorescentiae* 3–6-florae, in axillis foliorum cicatricum positae ; pedicelli crassi, aureo-sericeo-pubescentes, 1·5–2 cm. longi. *Calyx* extra aureo-sericeo-pubescens, intus glaber ; lobi 3 exteriores late ovati vel deltoidei, 3·5 mm. longi, 3 mm. lati, apice obtusi, 3 interiores late ovati vel subrotundati, 3·5–4 mm. longi, 3–3·5 mm. lati, leviter carinati, valde ciliati, apice rotundati. *Corolla* alba (ex *Garrett*), extra glabra ; tubus 3 mm. longus ; petala 6, ovata vel elliptica, 7 mm. longa, 4 mm. lata, ciliolata, apice rotundata. *Stamina* 18–20, fauce inserta ; filamenta crassa, 2–3 mm. longa ; antherae 3 mm. longae, apice acutae. *Ovarium* aureo-sericeo-pubescens, circa 1·5 mm. diametro, 6-loculatum ; stylus basi adpresse pubescens, crassus, 10 mm. longus.

Chiengmai, Doi Pa Kao, East slope near Me Nya, c. 1055 m., *Garrett* 113.

Palaquium koratense *Fletcher* [Sapotaceae-Palaquiinae] ; species *P. obovato* Engler affinis, sed ovario sericeo-pubescente nec glabro, stylo minore differt.

Arbor circiter 20 m. alta (ex *Kerr*) ; ramuli crassi, cicatricibus permultis foliorum inflorescentiarumque tecti primo adpresse puberuli, mox glabrescentes, cortice brunneo obtecti. *Folia* ad ramulorum apices dispersa, oblanceolata vel oblongo-oblanceolata, apice rotundata vel late obtusa, basi cuneata, 10–18 cm. longa, 3–6 cm. lata, coriaceo-chartacea, supra griseo-brunnea viridi-tincta, subtus brunnea, utrinque glabra, costa supra impressa subtus valde prominente, nervis lateralibus 12–16-paribus supra subconspicuis subtus prominulis angulo 70-80° e costa excurrentibus intra marginem

arcuatis, nervis transversis numerosis plus minusve parallelis, margine integra leviter recurva, petiolo 1–2 cm. longo supra valde canaliculato adpresse puberulo suffulta. *Inflorescentiae* 2-florae, in axillis foliorum cicatricum positae ; pedicelli 2 cm. longi, aureo-sericeo-pubescentes, apice incrassati. *Calyx* extra aureo-sericeo-pubescens, intus glaber vel sparse puberulus ; lobi 3 exteriores late ovati vel deltoidei, 3–3·5 mm. longi, 4 mm. lati, apice obtusi, ciliolati, 3 interiores late ovati 4 mm. longi, 4–4·5 mm. lati, carinati, ciliati, apice obtusi vel subrotundati. *Corolla* alba (ex *Kerr*), extra glabra ; tubus crassus, cylindricus, 3·5–4 mm. longus ; lobi 6, ovati vel elliptici, 8 mm. longi, 4 mm. lati, ciliolati, apice truncati. *Stamina* 12–14, fauce inserta ; filamenta 3–4 mm. longa ; antherae 4·5–5 mm. longae, apice acutae. *Ovarium* aureo-sericeo-pubescens, circa 1·5 mm. diametro, 6-loculatum ; stylus crassus, 7–10 mm. longus.

Korat, Lao Lem, c. 900 m., evergreen forest, *Kerr* 9966.

Palaquium punctatum *Fletcher* [Sapotaceae-Palaquiinae] ; species *P. obovato* Engler affinis, sed foliis subtus punctatis recedit.

Arbor circiter 20 m. alta (ex *Kerr*) ; ramuli crassi, cicatricibus permultis foliorum inflorescentiarumque tecti, primo adpresse ferrugineo-puberuli mox glabri, cortice brunneo vel cinereo-brunneo obtecti. *Folia* ad ramulorum apices dispersa, oblanceolata vel oblongo-oblanceolata, apice rotundata vel late obtusa, basi attenuata, 12–15 cm. longa, 4–6 cm. lata, coriacea, supra brunnea viridi-tincta, subtus cinerea, utrinque glabra, subtus minute punctata, costa supra impressa subtus valde prominente, nervis lateralibus 10–12-paribus supra subconspicuis subtus prominulis angulo 45° e costa excurrentibus intra marginem arcuatis, nervis transversis paucis irregularibus, margine integra leviter recurva, petiolo circa 2 cm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentiae* 4–6-florae, in axillis foliorum cicatricum positae ; pedicelli circiter 10 mm. longi, striati, ferrugineo-puberuli, apice incrassati. *Flores* immaturi ; alabastri rotundati 3–4 mm. diametro.

Kaw Tao, c. 100 m., evergreen forest, *Kerr* 16028.

Although the specimen is in flower-bud only, its punctate leaves make it a very distinct plant.

Madhuca esculenta *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. neriifoliae* (Moon) H. J. Lam affinis, sed foliis angustioribus, nervis lateralibus magis remotis, sepalis minoribus differt.

Arbor circiter 8 m. alta (ex *Kerr*) ; ramuli quadrangulares, primo adpresse puberuli mox glabri, cortice brunneo obtecti. *Folia* elliptica, apice late obtusa vel subrotundata, basi cuneata, 12–16 cm. longa, 4–7 cm. lata, coriacea vel chartaceo-coriacea, utrinque griseo-brunnea viridi-tincta, glabra, nitida, nervis supra subconspicuis, costa subtus valde prominente, nervis lateralibus circa 18-paribus subtus prominulis parallelis angulo 70° e costa excurrentibus intra marginem arcuatim junctis, nervis transversis numerosis ± parallelis subtus subprominulis, margine integra

leviter recurva, petiolo circiter 3 cm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentiae* axillares ; flores deficientes ; pedicelli 10–12 mm. longi, sparce aureo-puberuli. *Calyx* (in fructu) extra aureo-pubescens, intus glaber ; sepala late ovata, apice obtusa vel subrotundata, ciliata, leviter carinata, 5 mm. longa et lata. *Fructus* esculentus (ex *Kerr*), ovoideus, 3 cm. longus, 1–1·5 cm. diametro, apice acuminatus, 1-spermus.

Pitsanulok, Panak, c. 300 m., by stream in deciduous forest, *Kerr* 8911. Kaw Chang, Klawng Mayom, c. 100 m., evergreen forest, *Kerr* 6931 (*type*).

Madhuca grandiflora *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. longifoliae* (Koen.) H. J. Lam affinis, sed pedicellis minoribus tomentosis nec paene glabris, fructibus juvenilibus glabris nec dense hirsutis differt.

Arbor circiter 15–20 m. alta (ex *Kerr*) ; ramuli crassi, rugosi, cicatricibus permultis foliorum inflorescentiarumque tecti, primo adpresse puberuli mox glabri, cortice brunneo vel cinereo obtecti. *Folia* ad ramulorum apices dispersa, lanceolata vel late oblanceolata, apice acuta vel fere mucronata basi cuneata, 5–20 cm. longa, 1·5–6 cm. lata, chartacea vel coriaceo-chartacea, utrinque brunnea vel griseo-brunnea, glabra vel subtus adpresse aureo-puberula, costa supra subconspicua subtus valde prominente, nervis lateralibus 20–22-paribus subtus subprominulis parallelis angulo 60–70° e costa excurrentibus intra marginem arcuatis, nervis transversis saepe obscuris, margine integra, petiolo 2–4·5 cm. longo glabro vel puberulo suffulta. *Inflorescentiae* multiflorae, ad ramulorum apices dispersae ; pedicelli apice incrassati, adpresse fulvo-tomentosi, 1·75–2 cm. longi. *Calyx* intus et extra adpresse fulvo-pubescens ; sepala 2 exteriora late ovata, 9 mm. longa, 6–7 mm. lata, apice late obtusa vel rotundata, ciliata, 2 interiora 5–6 mm. lata, 9 mm. longa, leviter carinata, apice obtusa, ciliata. *Corolla* extra glabra, 2·2–2·5 cm. longa ; tubus crassus, late cylindricus, circiter 1·2 cm. longus ; petala 12, imbricata, elliptica vel oblonga, 10–12 mm. longa, 4·5 mm. lata, apice rotundata ; faux glabra. *Stamina* 28, fauce inserta ; filamenta apice geniculata, 4 mm. longa ; antherae 5 mm. longae, acuminatae, apice mucrone acuto glabro ornatae. *Ovarium* glabrum, 3 mm. diametro, 12-loculatum ; stylus exsertus, glaber, filiformis, circiter 30 mm. longus. *Fructus* globosus vel ellipsoideus, 10–13 mm. longus, 10 mm. diametro.

Krat, Kan Chumpan, under 50 m., evergreen forest, *Kerr* 17659 (*type*). Krabin, Sakeo, c. 50 m., milky juice, scrub jungle, *Kerr* 9760. Krabin, Ban Keng, c. 25 m., open deciduous forest, *Kerr* 19856.

Madhuca grandifolia *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. macrophyllae* (Hasskarl) H. J. Lam affinis, sed foliis basi attenuatis nec rotundatis nec subcordatis, petiolis multo longioribus, pedicellis brevioribus differt.

Arbor circiter 10 m. alta (ex *Kerr*) ; ramuli crassi, ad 2 cm. diametro, cicatricibus permultis foliorum inflorescentiarumque tecti, glabri, cortice brunneo vel griseo-brunneo obtecti. *Folia* elliptica vel obovata, apice acuminata, basi attenuata, 25–65 cm. longa, 12–18 cm. lata, chartaceo-coriacea, utrinque brunnea glabra, costa supra valde impressa subtus manifeste prominente, nervis lateralibus circiter 20-paribus, supra subconspicuis subtus prominentibus parallelis angulo 45-50° e costa excurrentibus intra marginem arcuatim junctis, nervis transversis utrinque prominulis numerosis parallelis, margine integra, petiolo 8–15 cm. longo crasso supra canaliculato glabro suffulta. *Inflorescentiae* multiflorae, in axillis foliorum cicatricum positae. *Flores* non visi. *Calyx* (in fructu) extra adpresse fulvo-pubescens, intus glaber vel sparse pubescens ; sepala late ovata, 7 mm. longa, 5 mm. lata, apice rotundata ; pedicelli crassi, circiter 2·5 cm. longi, glabri vel sparse puberuli. *Fructus* ellipticus, 3·5–4 cm. longus, apice stylo persistente coronatus, rubiginoso-pilosus.

Pang-nga, Kao Katakwan, c. 400 m., evergreen forest, *Kerr* 18408.

Madhuca Kerrii *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. punctatae* Fletcher affinis, sed foliis minoribus haud punctatis, floribus pedicellisque minoribus differt.

Arbor circiter 3 m. alta (ex *Kerr*) ; ramuli gracillimi, cicatricibus foliorum inflorescentiarumque tecti, primo puberuli mox glabri, cortice cinereo vel brunneo obtecti. *Folia* elliptica vel obovata, apice rotundata, basi cuneata, 4–9 cm. longa, 2–4 cm. lata, chartacea vel coriaceo-chartacea, supra griseo-brunnea viridi-tincta, subtus brunnea, utrinque glabra, costa supra conspicua subtus prominente, nervis lateralibus 10–12-paribus subtus subprominulis parallelis angulo 45–50° e costa excurrentibus intra marginem arcuatis, nervis transversis irregularibus, margine integra, petiolo 5–10 mm. longo puberulo vel glabro suffulta. *Inflorescentiae* in foliorum vel eorum cicatricum axillis positae, 3–6-florae ; pedicelli sparse aureo-sericeo-pilosi, 8–12 mm. longi. *Calyx* extra aureo-pubescens, intus glaber vel sparse puberulus ; sepala 2 exteriora ovata vel leviter elliptica, 5–6 mm. longa, 3 mm. lata, ciliata, apice late obtusa, 2 interiora leviter carinata, circa 5 mm. longa ciliata apice rotundata. *Corolla* alba (ex *Kerr*), extra glabra, circa 8 mm. longa ; tubus 3 mm. longus ; petala 8 imbricata, oblonga vel obovata, 5 mm. longa, 2 mm. lata, apice rotundata ; faux hirsuto-villosa. *Stamina* fauce inserta, circiter 14–16 ; filamenta 2–2·5 mm. longa, hirsuto-villosa ; antherae circiter 2 mm. longae, apice longe acuminatae. *Ovarium* aureo-pilosum, 1 mm. diametro, 7–8-loculatum ; stylus exsertus, glaber, 8–9 mm. longus. *Fructus* ignotus.

Surin, Songka, c. 100 m., open deciduous forest, *Kerr* 8317 (*type*) ; light evergreen forest, *Kerr* 8261.

Madhuca punctata *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. longifoliae* (Koen.) H. J. Lam affinis, sed foliis obovatis nec ellipticis, subtus minute punctatis, stylis longioribus differt.

Arbor circiter 7 m. alta (ex *Kerr*) ; ramuli crassi, cicatricibus foliorum inflorescentiarumque tecti, adpresse pubescentes, cortice brunneo obtecti. *Folia* obovata, apice emarginata, basi attenuata, 10–15 cm. longa, 5–8 cm. lata, coriacea, utrinque griseo-brunnea, subtus pallidiora, supra glabra costa primo excepta, subtus primo aureo-pilosa mox glabra, minute punctata, costa supra leviter impressa, subtus valde prominente, nervis lateralibus 12–16-paribus subtus prominulis parallelis angulo 50–70° e costa excurrentibus intra marginem arcuatis, nervis transversis numerosis irregularibus, margine integra, petiolo 2·5–3·5 cm. longo canaliculato piloso vel puberulo suffulta. *Inflorescentiae* in foliorum vel eorum cicatricum axillis positae, 3–6-florae ; pedicelli cinereo- vel aureo-tomentosi, 2–3 cm. longi. *Calyx* intus et extra fulvo-tomentosus ; sepala 2 exteriora late ovata, 7·5–8 mm. longa, 7 mm. lata, ciliata, apice rotundata, 2 interiora carinata, 7·5 m. longa, ciliata, apice rotundata. *Corolla* extra glabra, 10–11 mm. longa ; tubus crassus, cylindricus, 5 mm. longus ; petala 10, imbricata, oblonga, 5–6 mm. longa, 3–4 mm. lata, apice rotundata. *Stamina* fauce inserta, circiter 28 ; filamenta 2–2·5 mm. longa, crassa ; antherae circiter 4 mm. longae, acuminatae, mucrone acuto glabro munitae. *Ovarium* conoideum, 2·5–3 mm. diametro, glabrum ; stylus exsertus, filiformis, villosus, 12–13 mm. longus. *Fructus* ignotus.

Lampun, c. 330 m., deciduous forest, *Kerr* 3153.

Madhuca stipulacea *Fletcher* [Sapotaceae-Palaquiinae] ; species *M. grandiflorae* Fletcher affinis, sed foliis haud lanceolatis, nervis lateralibus paucioribus, stipulis carinatis, pedicellis longioribus, corolla minore differt.

Arbor parva, circiter 7–8 m. alta (ex *Kerr*) ; ramuli crassi, rugosi, cicatricibus permultis foliorum inflorescentiarumque tecti, primo adpresse puberuli mox glabri, cortice brunneo obtecti. *Folia* oblongo-obovata vel oblongo-oblanceolata, apice rotundata, basi cuneata, 6–13 cm. longa, 2·5–7 cm. lata, coriacea vel chartaceo-coriacea, supra brunnea vel viridi-brunnea, subtus pallidiora, utrinque glabra, costa supra subconspicua vel leviter impressa subtus valde prominente, nervis lateralibus 10–13-paribus subtus prominulis parallelis angulo 45° e costa excurrentibus intra marginem arcuatis, nervis transversis validis irregularibus, margine integra, petiolo 2–2·5 cm. longo glabro vel sparse pubescente suffulta ; stipulae lanceolatae, circa 10 mm. longae, valide carinatae. *Inflorescentiae* multiflorae, ad ramulorum apices dispersae ; pedicelli apice incrassati, griseo-sericeo-pubescentes, 3·5–4 cm. longi. *Calyx* intus et extra sericeo-pubescens ; sepala 2 exteriora late ovata, circiter 8 mm. longa, 7 mm. lata, apice rotundata, ciliata, 2 interiora late ovata vel subrotundata, 8·8 mm. longa, 7–8 mm. lata, leviter

carinata, longe ciliata. *Corolla* rubicundo-alba (ex *Winit*), extra glabra, circiter 11–12 mm. longa ; tubus crassus, cylindricus, 4 mm. longus ; petala 14, imbricata, oblonga, 7–8 mm. longa, 2 mm. lata, apice obtusa vel rotundata ; faux hirsuto-pilosa. *Stamina* 28, fauce inserta, subsessilia ; antherae 4·5–5 mm. longae, acuminatae, apice mucrone obtuso sparse piloso vel glabro praeditae. *Ovarium* circiter 2 mm. diametro, glabrum, 10-loculatum ; stylus exsertus, glaber, filiformis, 13 mm. longus. *Fructus* globosus, 1·5 cm. diametro.

Chiengmai, Me Kang, c. 420 m., pê forest, *Winit* 1295 (*type*). Lampun, Me Li, c. 270 m., pê forest, *Winit* 1562. Lampang, Che Sawn, c. 400 m., dry deciduous forest, *Kerr* 4772. Utaradit, c. 100 m., by side of dry stream in open deciduous forest, *Kerr* 5898.

Diploknema siamensis *Fletcher* [Sapotaceae-Palaquiinae] ; species *D. butyraceae* (Roxb.) H. J. Lam affinis, sed foliis subtus glabris nec pilosis, floribus pedicellisque minoribus ferrugineo-pubescentibus nec aureo-pubescentibus differt.

Arbor circiter 10 m. alta (ex *Kerr*) ; ramuli crassi, cicatricibus permultis foliorum inflorescentiarumque tecti, primo adpresse puberuli mox glabrescentes, cortice brunneo vel griseo-brunneo obtecti. *Folia* elliptica vel obovata, apice rotundata vel obtusa, basi cuneata, 20–45 cm. longa 7–18 cm. lata, chartaceo-coriacea, utrinque brunnea, subtus pallidiora, glabra, costa supra valde impressa subtus prominente, nervis lateralibus circa 16-paribus, supra leviter impressis subtus subprominentibus parallelis angulo 45°–50° e costa excurrentibus intra marginem arcuatim junctis, nervis transversis validis numerosis ± parallelis, margine integra, petiolo 4–12 cm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentiae* multiflorae, in axillis foliorum cicatricum positae ; pedicelli apice incrassati, ferrugineo-pubescentes, 1·5–2 cm. longi. *Calyx* intus et extra sericeo-pubescens ; sepala 2 exteriora ovata, 7·5–8 mm. longa, 5·5–6 mm. lata, ciliata, apice rotundata, interiora 3 ovata vel elliptica, 6·5–7 mm. longa, 4·5–5 mm. lata, ciliata, apice rotundata. *Corolla* alba (ex *Kerr*), extra glabra vel puberula, 11–12 mm. longa ; tubus crassus, cylindricus, 4 mm. longus ; petala 14, imbricata, obovata vel oblonga, 6-7 mm. longa, 2·5 mm. lata, apice rotundata ; faux sparse fulvo-villosa. *Stamina* 0. *Staminodia* 26–28, fauce inserta, petaloidea, 5–6 mm. longa, 0·5–1 mm. lata, apice rotundata et dentata. *Ovarium* aureo- vel fulvo-pilosum, 2 mm. diametro, 9-loculatum ; stylus exsertus, basi sparse pilosus, crassus, cavatus, 10 mm. longus.

Chumpawn, Siepyuan, c. 20 m., evergreen forest, *Kerr* 16260.

Payena punctata *Fletcher* [Sapotaceae-Palaquiinae] ; species *P. lucidae* DC. affinis, sed foliis subtus punctatis differt.

Arbor circiter 35 m. alta (ex *Kerr*) ; ramuli teretes, primo ferrugineo-pubescentes, cortice brunneo obtecti. *Folia* elliptica vel oblongo-elliptica, apice attenuata, obtusa, basi cuneata, 7–10 cm.

longa 2–3 cm. lata, chartacea, utrinque cinerea glabraque nisi subtus ad costam tenuiter ferrugineo-pubescentia, subtus manifestius punctata, costa supra subconspicua subtus prominente, nervis lateralibus numerosis parallelis supra impressis subtus subprominulis angulo 60–70° e costa excurrentibus intra marginem arcuatim junctis, margine integra, petiolo 1·5–2 cm. longo canaliculato ferrugineo-pubescente suffulta. *Inflorescentiae* in foliorum axillis positae, 3–6-florae ; pedicelli aureo-pubescentes, apicem versus incrassati, circiter 1·5 cm. longi. *Calyx* extra adpresse aureo-pubescens, intus aureo-puberulus ; lobi 4, late ovati, 5 mm. lati et longi, apice obtusi vel rotundati, ciliati, crassi, 2 interiores tenuiores, 2 exteriores crassiores. *Corolla* alba (ex *Kerr*), extra adpresse aureo-pubescens, immatura ; tubus circa 3 mm. longus, intus glaber ; lobi 8, 4 exteriores et 4 interiores, elliptici vel oblongo-elliptici, 4·5–5 mm. longi, 2·5–3 mm. lati, apice rotundati ciliolati. *Stamina* 16–18, fere sessilia, filamentis crassis, antheris acuminatis 2–5·5 mm. longis. *Ovarium* ferrugineo-pilosum, 8-loculatum, 2·5 mm. diametro ; stylus 10 mm. longus, basi pilosus.

Satul, Adang, c. 50 m., evergreen forest, *Kerr* 14027.

Represented by a small twig only, but clearly distinguished from all other collections by the glandular punctate lower surface of the leaves.

Sarcosperma siamense *Fletcher* [Sarcospermaceae] ; species *S. arboreo* Benth. affinis, sed foliis ramulisque tomentosis differt.

Arbor circiter 6 m. alta (ex *Kerr*) ; ramuli teretes, primo tomentosi mox pubescentes, cortice cinereo vel cinereo-brunneo obtecti. *Folia* opposita, oblonga vel ovato-oblonga, 20–30 cm. longa, 6–12 cm. lata, apice subito acuminata, basi cuneata vel subrotundata, chartaceo-coriacea, utrinque brunnea, supra glabra, subtus et praesertim ad nervos ferrugineo-tomentosa, costa supra subconspicua vel leviter impressa subtus valde prominente, nervis lateralibus 15–16-paribus supra leviter impressis subtus prominentibus parallelis angulo 50° e costa excurrentibus intra marginem arcuatis (glandulis axillaribus praesentibus), nervulis supra impressis subtus prominulis numerosis parallelis, margine integra, petiolo 5–7 mm. longo tomentoso suffulta ; stipulae lineares, 5 mm. longae, deciduae. *Inflorescentiae* oppositae, axi dense ferrugineo-tomentoso ; bracteae ovatae. *Sepala* rotundata, subaequalia, valde imbricata, tria exteriora crassa pilosa, duo interiora minus crassa margine lato hyalino. *Corolla* decidua, tubo brevi, lobis 5 rotundatis imbricatis. *Stamina* 5, tubo corollae affixa, filamentis brevissimis, antheris ovatis obtusis ; staminodia 5, ovata, attenuata. *Ovarium* glabrum, 2-loculatum, loculis uniovulatis, ovulis erectis ; stylus subbifidus. *Fructus* ignotus.

Nan, Hui Kua, c. 300 m., evergreen forest by stream, *Kerr* 5027.

Huodendron siamicum *Fletcher* [Styracaceae] species *H. biaristato* (W. W. Sm.) Rehd. affinis, sed nervis lateralibus numerosioribus,

reticulatione utrinque magis prominula, floribus paucioribus minoribus differt.

Arbor circiter 20 m. alta (ex *Kerr*) ; ramis gracilibus teretibus vel apicem versus leviter complanatis pubescentibus vel glabris. *Folia* alterna, elliptica vel oblongo-elliptica, 8–15 cm. longa, 3–6 cm. lata, apice longe attenuata, basi cuneata, chartacea, utrinque viridia, glabra, costa supra impressa subtus valde prominente, nervis lateralibus circiter 10-paribus supra subconspicuis vel leviter impressis subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis numerosis parallelis, nervulis numerosis utrinque prominulis, margine integra vel leviter et remote denticulata, petiolo 8–10 mm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentia* dense albo-tomentosa, corymboso-paniculata ; pedicelli circa 5 mm. longi. *Calycis* tubus cupuliformis, 1·5 mm. longus, tomentosus, dentibus triangulari-ovatis dimidium tubum subaequantibus ciliatis. *Petala* alba (ex *Kerr*), oblonga, 6·5–7 mm. longa, filamentis compressis utrinque dense pilosulis circiter 2·5 mm. longis, antheris glabris connectivo dorso puberulo in appendicem tridentatum elongato, dentibus lanceolatis acutis. *Stylus* staminibus paulo longior, crassus, dense pilosulus, apice 3–4-lobatus ; discus pilosus.

Ranawng, Kao Pawta Luang Keo, c. 500 m., evergreen forest, *Kerr* 16909.

Ardisia oxystemon *Ridley* MS., descr. *Fletcher* (Myrsinaceae-Eumyrsineae) ; *A. porosae* C. B. Clarke affinis, sed floribus minoribus, pedicellis paene absentibus nec circiter 1·5 cm. longis differt.

Frutex circiter 3 m. altus (ex *Kerr*) ; ramuli teretes vel leviter complanati, glabri, brunnei vel griseo-brunnei. *Folia* elliptica, 10–22 cm. longa, 4–10 cm. lata, apice acuta vel obtusa, basi cuneata vel saepe subrotundata, chartacea, supra cinerea vel cinereo-brunnea, subtus pallidiora, utrinque glabra, lepidibus minutissimis peradpressis consita, leviter glandulosa, costa supra subconspicua vel leviter impressa subtus valde prominente, nervis lateralibus circiter 12–paribus subtus prominulis parallelis intra marginem arcuatim junctis, margine integra, petiolo 5–10 mm. longo crasso glabro supra complanato vel canaliculato suffulta. *Inflorescentia* terminalis, ad 15 cm. longa, minute ferrugineo-puberula vel glabra, ex umbellis racemose composita ; pedicelli circiter 1 mm. longi vel paene absentes. *Sepala* basi breviter coalita, ovata, 1·5 mm. longa, 1 mm. lata, apice rotundata, dorso sparse puberula, glandulosa, ciliolata. *Corolla* punicea (ex *Kerr*) ; tubus brevis ; lobi ovati, apice obtusi, 5 mm. longi, 3 mm. lati, bene glandulosi. *Stamina* petalis subaequilonga, antheris 4 mm. longis acutis dorso punctatis, filamentis 1–1·5 mm. longis. *Ovarium* subglobosum, circiter 1 mm. diametro ; stylus 5 mm. longus. *Bacca* globosa, 6 mm. diametro.

Chumpawn, Ta Ngaw, c. 50 m., evergreen forest, *Kerr* 11459 : Surat, Ban Kawp Kep, c. 100 m., evergreen on rocky limestone hill,

Kerr 13361 : Pang-nga, Tap-put, c. 100 m., light evergreen forest, *Kerr* 18546 : Krabi, c. 50 m., evergreen at foot of limestone hill, *Kerr* 18841 (*type*) : Trang, *H. C. Robinson* 6411 : near stream, *Mrs. D. J. Collins* 2394 : Patalung, Kao Oktalu, c. 100 m., evergreen on limestone hill, *Kerr* 15332 : Tungsong, *Put* 2339 : Yula, Banang Sta, c. 50 m., abundant in undergrowth of evergreen forest, *Kerr* 7298.

Diospyros betongensis *Fletcher* [Ebenaceae] ; *D. ellipsoideae* King et Gamble affinis, sed foliis oblongis subtus glabris, nervis supra haud impressis, fructibus globosis nec ellipsoideis differt.

Arbor gracilis, circiter 5 m. alta (ex *Kerr*) ; ramuli quadrangulares, cavi, glabri, cortice brunneo vel cinereo paucilenticellato obtecti. *Folia* oblonga, apice acuminata, acuta, basi rotundata, 30–40 cm. longa, 7–10 cm. lata, chartaceo-coriacea, nitida, utrinque brunnea viridi-tincta, glabra, subtus lepidibus minutis albis instructa, costa supra subconspicua vel leviter impressa subtus valde prominente lenticellis paucis praedita, nervis lateralibus 10–14-paribus supra subconspicuis subtus prominentibus parallelis intra marginem anastomosantibus, nervis transversis paucis irregularibus cum nervulis utrinque prominulis, margine integra leviter recurva, petiolo circiter 7 mm. longo supra complanato apicem versus canaliculato glabro suffulta. *Flores* deficientes. *Fructus* brevissime pedicellatus ; calyx mox deciduus ; bacca globosa, 2 cm. diametro, primo leviter ferrugineo-pilosa mox glabrescens, disperma ; semina lateraliter compressa, 12 mm. lata et longa, rugosa.

Pattani, Bêtong, c. 400 m., evergreen forest, *Kerr* 7673.

Diospyros bracteata *Fletcher* [Ebenaceae] ; *D. castaneae* (Craib) Fletcher* affinis, sed foliis minoribus supra valde nitidis ovatis vel ellipticis nec oblongo-rotundatis basi nunquam cordatis, corollae lobis maioribus differt.

Arbor circiter 7 m. alta (ex *Kerr*) ; ramuli quadrangulares vel teretes, glabri, brunnei vel nigri, lenticellis numerosis elongatis praediti. *Folia* ovata vel elliptica, apice rotundata vel leviter cuneata, 6–10 cm. longa, 2·5–5 cm. lata, chartaceo-coriacea, sicco castanea, infra pallidiora, utrinque glabra, supra nitida, costa supra subconspicua vel leviter impressa subtus prominente, nervis lateralibus circiter 10-paribus supra subconspicuis infra prominulis, nervulis paucis utraque pagina subconspicuis, margine integra, petiolo 5–8 mm. longo supra apicem versus canaliculato glabro suffulta. *Inflorescentia mascula* axillaris, sessilis, basi dense imbricatim bracteata, rhachi bracteisque extra sericeis ; bracteae florales naviculiformes, circiter 4 mm. longae, deciduae. *Calyx* ellipsoideo-tubulosus, breviter 3-lobatus, 8 mm. longus, 4 mm. diametro, extra sericeus. *Corolla* alba (ex *Kerr*) ; tubus 8 mm. longus, extra basi glaber superne dense sericeus ; lobi 3, oblongo-elliptici, 10 mm.

* **Diospyros castanea** (*Craib*) *Fletcher*, comb. nov.—*Maba castanea* Craib in Kew Bull. 1915, 432.

longi, 5 mm. lati, apice obtusi vel subrotundati, utrinque sericei. *Stamina* 12, antheris obtusis circiter 2 mm. longis, filamentis 1–2 mm. longis apice saepe geniculatis.

Udawn, Nawng Bua, c. 200 m., open deciduous forest, *Kerr* 2615. Kukan, Kantararom, c. 100 m., open scrub, *Kerr* 8326 (*type*).

Diospyros brachiata *King et Gamble* var. **lanceolata** *Fletcher*, a typo foliis late lanceolatis nec elliptico-oblongis differt.

Puket, Kamala, c. 50 m., scrub, *Kerr* 17412.

Diospyros calcarea *Fletcher* [Ebenaceae]; *D. sinensi* Hemsl. affinis, sed foliis pedicellisque fructibusque minoribus, fructibus glabris, calycis lobis brevioribus haud prominenter venosis differt.

Frutex scandens (ex *Kerr*); ramuli graciles, teretes, primo leviter albo-pilosi mox glabrescentes, spinosissimi, cortice brunneo vel cinereo-brunneo obtecti. *Folia* ovata vel elliptica, 1·5–5 cm. longa, 1–1·75 cm. lata, apice attenuata, acuta vel obtusa, basi cuneata vel rotundata vel cordulata, chartacea, utrinque viridia vel brunnea, subtus pallidiora, pagina superiore sparse puberula vel saepe glabrescente, inferiore juventute sparse pubescente mox paene glabra leviter glandulosa, costa supra subconspicua subtus prominente, nervis lateralibus 3–4-paribus supra subconspicuis subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis nervulisque utrinque obscuris, margine integra, petiolo 2 mm. longo leviter piloso suffulta. *Flores masculi* albi (ex *Kerr*), axillares; pedicelli circiter 2 mm. longi, graciles, pilosi. *Calyx* extra sparse pubescens, usque ad basin 4-partitus, segmentis ovatis 1·5 mm. longis 1 mm. latis apice acutis valde ciliatis. *Corolla* glabra, urceolata; tubus 3·5 mm. altus; lobi 4, valde imbricati, subrotundati, 3 mm. lati, patentes. *Stamina* 14–16, per paria connata, antheris 3–4 mm. longis acutis, filamentis brevibus. *Ovarium* obsoletum. *Flores feminei* ignoti. *Fructus* axillares, solitarii; pedicelli 4–6 mm. longi, puberuli vel glabri, apice incrassati cum calyce articulati; calyx intus et extra leviter puberulus, usque ad basin 4-partitus, segmentis ovatis 10 mm. longis 6 mm. latis apice obtusis vel subrotundatis patentibus; fructus globosus, 10 mm. diametro.

Kanburi, Wang Kanai, c. 50 m., limestone rocks, *Kerr* 12870. Prachuap, Sam Roi Yawt, under 50 m., evergreen forest on limestone hill, *Kerr* 10976 (*type*).

Diospyros coaetanea *Fletcher* [Ebenaceae]; *D. saxosae* Fletcher affinis, sed nervis lateralibus numerosioribus, reticulatione scalariformi, floribus coaetaneis maioribus differt.

Arbor circiter 20 m. alta (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, primo ferrugineo-pubescentes mox glabrescentes, cortice cinereo paucilenticellato obtecti. *Folia* elliptica vel oblongo-elliptica, ad 20 cm. longa, ad 7 cm. lata, apice acuta, basi cuneata,

chartaceo-coriacea, utrinque brunnea, pagina superiore glabra, inferiore leviter adpresse pubescente, costa supra impressa subtus valde prominente, nervis lateralibus circiter 20-paribus supra subconspicuis subtus prominulis parallelis intra marginem anastomosantibus, nervis transversis numerosis parallelis utrinque subprominulis scalariformiter currentibus, margine integra leviter recurva, petiolo 7–10 mm. longo supra canaliculato glabro suffulta. *Flores masculi* cum foliis coaetanei, in cymis axillaribus breviter pedicellatis dispositi. *Calyx* intus et extra ferrugineo-pilosus ; tubus 4–5 mm. altus ; lobi 4–5, late triangulares, 5 mm. longi, 5 mm. lati, apice acuti. *Corolla* tubulosa, extra basi excepta ferrugineo-pilosa ; tubus 10 mm. longus, intus glaber ; lobi 4-5, imbricati, reniformes, 2·5 mm. longi, 4 mm. lati, reflexi. *Stamina* 10, per paria connata, antheris 3–4 mm. longis lanceolatis apice acutis, filamento communi 1 mm. longo, filamentis partialibus 1–1·5 mm. longis glabris. *Ovarium* obsoletum, conicum, 1 mm. longum, apice pilis paucis albis ornatum.

Mê Hawng Sawn, Hui Pong Dan, c. 400 m., mixed forest, *Kerr* 5466 (*type*), Prê Mê Song, c. 330 m., *Vanpruk* 295. Nakawn Tai, c. 300 m., mixed deciduous forest, *Kerr* 8890.

Diospyros defectrix *Fletcher* [Ebenaceae] ; *D. cauliflorae* Blume affinis, sed floribus femineis solitariis nec paniculatis differt.

Frutex circiter 3 m. altus (ex *Kerr*) ; ramuli obtuse quadrangulares vel teretes, primo leviter ferrugineo-pubescentes mox glabrescentes, cortice brunneo vel cinereo paucilenticellato obtecti. *Folia* ovata vel ovato-oblonga, apice lata obtusa, basi rotundata vel cordulata, 10–15 cm. longa, 4–7 cm. lata, chartaceo-coriacea, utrinque brunnea (subtus pallidiora), glabra, subtus lepidibus minutis albis paucis instructa, costa supra impressa subtus prominente, nervis lateralibus 6–8-paribus supra leviter impressis subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis paucis plus minusve irregularibus cum nervulis subtus subprominulis, margine integra leviter recurva, petiolo 5–10 mm. longo supra canaliculato adpresse ferrugineo-puberulo suffulta. *Flores feminei* solitarii, in axillis foliorum vel eorum cicatricum positi, breviter pedicellati, basi bracteati, bracteis extra dense pilosis. *Calyx* intus et extra adpresse aureo-pilosus ; tubus 1·5 mm. altus ; lobi 4·5, late ovati, basi imbricati, 3·5 mm. longi, 3 mm. lati, apice obtusi. *Corolla* alba (ex *Kerr*) ; tubus 3–3·5 mm. longus, basi glaber, superne breviter aureo-pilosus ; lobi 4–5, late ovati vel subrotundati, 3 mm. longi, 2·75–3 mm. lati, apice obtusi vel subrotundati, dorso aureo-pilosi. *Staminodia* 0. *Ovarium* subglobosum, 2 mm. longum, 1·5 mm. diametro, dense aureo-pilosum, 4-loculatum, loculis uniovulatis ; stylus brevis, bilobatus.

Kaw Tao, under 5 m., evergreen forest, *Kerr* 12676A, *Ke* 12677 (*type*).

The specific epithet refers to the lack of staminodes in the ♀ flower.

Diospyros fulvo-pilosa *Fletcher* [Ebenaceae] ; *D. strictae* Roxb. affinis, sed floribus masculis paucioribus, calycis lobis florum femineorum minoribus, fructibus pilosis nec glabris differt.

Arbor parva, circiter 7 m. alta (ex *Kerr*) ; ramuli graciles, teretes, dense fulvo-pilosi, cortice nigro vel cinereo-nigro obtecti. *Folia* ovata vel ovata-elliptica, apice attenuata basi cuneata, 5–10 cm. longa, 2–4 cm. lata, chartacea, nigra, nitida, pagina superiore costa excepta glabra, inferiore ad costam dense pilosa, nervis lateralibus pubescentibus, costa supra impressa subtus prominente, nervis lateralibus 8–10-paribus subtus prominulis parallelis intra marginem anastomosantibus, nervis transversis nervulisque obscuris, margine integra leviter recurva, petiolo 3 mm. longo dense fulvo-pilosa suffulta. *Flores masculi* pallido-flavi (ex *Kerr*), axillares, solitarii vel 2-fasciculati, subsessiles vel breviter pedicellati. *Calyx* usque ad basin 4-partitus, segmentis subrotundatis 2·5 mm. latis apice leviter apiculatis extra dense pilosis intus glabris vel puberulis ciliatis. *Corollae* tubus 4 mm. longus, extra glaber intus cinereo-puberulus ; limbus 4-partitus, segmentis subrotundatis 2·5 mm. latis apice truncatis intus et extra cinereo-puberulis. *Stamina* 16, per paria connata, antheris 2 mm. longis glabris breviter acuminatis, filamentis crassis 3 mm. longis leviter pilosis. *Ovarium* obsoletum, sparse pilosum. *Flores feminei* axillares, solitarii, breviter pedicellati. *Calyx* usque ad basin 4-partitus, segmentis late ovatis vel subrotundatis 5 mm. latis apice rotundatis extra pilosis intus glabris vel puberulis ciliatis. *Corolla* extra leviter pilosa ; tubus 6 mm. longus, intus leviter subpilosus ; limbus 4-partitus, segmentis oblongis 4·5–5 mm. longis 3 mm. latis apice rotundatis vel truncatis intus pilosis. *Staminodia* 9, lanceolata, 5 mm. longa, pilosa. *Ovarium* conoideum, 3 mm. diametro, fulvo-pilosum, 4-loculatum, loculis uniovulatis. *Fructus* (probabiliter immaturus) ellipticus, 10 mm. longus, 7 mm. diametro, fulvo-pilosus, stylo apice persistente, 4-loculatus, loculis 1-spermis.

Krabi ; Tambon Kao Panom, c. 100 m., evergreen forest, *Kerr* 18785. Satul, Ban Ton, c. 50 m., by stream in evergreen forest, *Kerr* 14426 (*type*).

Diospyros gracilis *Fletcher* [Ebenaceae] ; *D. sinensi* Hemsl. affinis, sed ramulis haud armatis, pedicellis fructuum minoribus, calycis lobis brevioribus differt.

Arbor parva, circiter 5 m. alta (ex *Kerr*) ; ramuli graciles, obtuse quadrangulares, primo puberuli mox glabri, cortice brunneo paucilenticellato obtecti. *Folia* ovata vel ovato-oblonga, apice obtusa, basi leviter cuneata vel rotundata vel subcordulata, 3–10 cm. longa, 1·5–3 cm. lata, coriacea, utrinque brunnea vel cinereo-brunnea subtus pallidiora, pagina superiore nitida ad costam puberula ceterum glabra, subtus omnino glabra, costa supra subconspicua vel leviter impressa subtus prominente, nervis lateralibus 8–10-paribus mox ascendentibus parallelis intra marginem arcuatim

junctis cum nervis transversis utrinque subprominulis vel saepe plus minusve obscuris, reticulatione laxa, margine integra, petiolo 4–6 mm. longo supra complanato ferrugineo-puberulo suffulta. *Flores* deficientes. *Fructus* axillares ; pedicelli 4–5 mm. longi, apice incrassati, sparse puberuli vel glabri ; calyx ad basin 4-partitus, segmentis leviter patentibus late ovatis 6–7 mm. longis 6 mm. latis apice obtusis intus et extra leviter glandulosis glabris vel sparse puberulis prominentibus nervosis ; bacca globosa, ad 2 cm. diametro, breviter apiculata, adpresse ferrugineo-pubescens interdum paene glabra, 4-loculata, loculis 1-spermis ; semina fabiformia.

Korat, Chantûk, Tachang, c. 300 m., evergreen forest, *Kerr* 9982. Korat, Chantûk, c. 150 m., evergreen forest, *Anuwat* 84. Chaibadan, Dong Paya Yen, c. 50 m., mixed forest, *Kerr* 7993 (*type*). Saraburi, Hin Lap, *Put* 2406.

Diospyros addita *Fletcher* [Ebenaceae] ; *D. transitoriae* Bakh. affinis, sed foliis haud areolatis, seminibus paucioribus latioribus haud nitidis, albumine haud ruminato differt.

Arbor ; ramuli obtuse quadrangulares, primo sparse puberuli mox glabri, cortice brunneo vel cinereo-brunneo vel cinereo paucilenticellato obtecti. *Folia* ovata vel sublanceolata, 5–13 cm. longa, 2–5 cm. lata, apice obtusa, basi leviter cuneata vel rotundata, coriacea, utrinque brunnea subtus pallidiora, glabra, pagina superiore valde nitida, costa supra conspicua subtus prominente, nervis lateralibus 8–10-paribus supra subconspicuis subtus subprominentibus parallelis intra marginem anastomosantibus, nervis transversis numerosis parallelis supra obscuris subtus prominulis vel per occasionem paene obscuris, reticulatione laxa inconspicua, margine integra leviter recurva, petiolo circiter 10 mm. longo crasso supra complanato glabro suffulta. *Flores* deficientes. *Fructus* axillares ; pedicelli 3–5 mm. longi, crassi, cinereo- vel fulvo-puberuli ; calyx usque ad basin 5-partitus, segmentis late ovatis vel subrotundatis 8-10 mm. longis 8 mm. latis basi valde imbricatis intus glabris extra sparse puberulis vel glabris patentibus vel reflexis conspicue nervatis ; bacca globosa vel obscure 3-lobata, 3–3·5 cm. diametro, breviter apiculata, 4-sperma ; semina 2 cm. longa.

Krabin, Aran Pratet, *Put* 3109.

Diospyros monosperma *Fletcher* [Ebenaceae] ; *D. simili* Craib affinis, sed ramulis foliis calycibusque femineis minus ferrugineo-pilosis, nervis supra minus impressis, petiolis longioribus differt.

Arbor circiter 4 m. alta (ex *Kerr*) ; ramuli graciles, teretes vel obtuse quadrangulares, primo conspicue ferrugineo-pilosi, mox glabrescentes, cortice brunneo vel cinereo-brunneo paucilenticellato obtecti. *Folia* elliptica vel oblongo-elliptica, apice late obtusa, basi cuneata vel rotundata, ad 16 cm. longa, ad 6 cm. lata, chartaceo-coriacea, utrinque brunnea subtus pallidiora, pagina superiore glabra inferiore leviter pilosa, costa supra impressa subtus valde

prominente, nervis lateralibus circiter 6-paribus supra impressis subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis paucis irregularibus, reticulatione laxa supra subconspicua vel saepe obscura, margine integra leviter recurva, peticlo 5–8 mm. longo ferrugineo-piloso supra apicem versus canaliculato suffulta. *Flores* deficientes. *Fructus* subsessiles; calyx extra adpresse ferrugineo-pilosus, intus dense adpresse ferrugineo-sericeus; tubus 3 mm. altus; lobi 4, late ovati vel late triangulares, circiter 5 mm. longi, 4 mm. lati; bacca immatura ellipsoidea, ad 10 mm. longa, ad 6 mm. diametro, breviter apiculata, leviter adpresse ferrugineo-pilosa, 4-loculata, 1-sperma.

Kaw Tao, near sea level, common in dry evergreen forest behind beach, *Kerr* 11108.

Diospyros fecunda *Fletcher* [Ebenaceae]; *D. transitoriae* Bakh. affinis, sed foliis ellipticis nec ovatis chartaceis nec coriaceis minute nec conspicue areolatis, seminibus numerosioribus, albumine haud ruminato differt.

Arbor circiter 7 m. alta (ex *Kerr*); ramuli teretes, primo sparse puberuli mox glabri, cortice brunneo paucilenticellato obtecti. *Folia* elliptica, 10–14 cm. longa, 4–7 cm. lata, apice attenuata, obtusa, basi cuneata, chartacea, minute areolata, pagina superiore griseo-brunnea viridi-tincta, inferiore brunnea glabra, costa supra impressa subtus prominente, nervis lateralibus 5–7-paribus supra subconspicuis subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis paucis irregularibus utrinque subprominulis, reticulatione laxa plus minusve obscura, margine integra leviter recurva, petiolo 8–12 mm. longo glabro supra canaliculato suffulta. *Flores* deficientes. *Fructus* e ramis annotinis orientes, in axillis foliorum cicatricum positi; pedicelli crassi, 5 mm. diametro, circiter 3–5 mm. longi; calyx extra sparse pubescens; tubus 2–3 mm. altus; lobi 5–6, triangulares, circiter 5 mm. longi, 5 mm. lati, apice obtusi, intus ferrugineo-sericei, patentes vel reflexi; bacca globosa, 4 mm. diametro, ferrugineo-sericea, maturitate glabrescens, 14–16-sperma; semina elliptica, plana, 15–17 mm. longa, 7 mm. lata.

Yala, Betong, c. 400 m., evergreen forest, *Kerr* 7658.

Diospyros bambuseti *Fletcher* [Ebenaceae]; *D. ferreae* (Willd.) Bakh. affinis, sed tubo lobisque corollae masculae subaequalibus, staminibus numerosioribus, ovario glabro differt.

Arbor circiter 20 m. alta; truncus basi striatus (ex *Kerr*); ramuli teretes, primo ferrugineo-pilosi mox glabri, cortice brunneo vel cinereo-brunneo obtecti. *Folia* elliptica vel oblongo-elliptica, apice obtusa vel subrotundata saepe emarginata, basi cuneata vel subrotundata, 3–8 cm. longa, 1·5–2·5 cm. lata, chartaceo-coriacea, utrinque brunnea glabra, costa utrinque parce pubescente supra impressa subtus prominente, nervis lateralibus circiter 10–12-paribus supra et infra conspicuis vel subprominulis parallelis intra marginem arcuatim junctis, nervis transversis paucis irregularibus,

nervulis numerosis subtus subprominulis vel saepe obscuris, margine integra leviter recurva, petiolo circiter 2 mm. longo supra valde canaliculato piloso suffulta. *Inflorescentiae masculae* axillares, e ramulis junioribus orti, 3-florae, dense bracteatae, rhachi bracteisque extra dense pilosis. *Calyx* extra glaber ; tubus 1–1·5 mm. longus ; lobi late ovati, 1–1·5 mm. lati, 1 mm. longi, apice rotundati, valde ciliolati. *Corolla* alba (ex *Kerr*), glabra ; tubus 2 mm. longus ; lobi 3, 2 mm. longi, 2–5 mm. lati, apice rotundati. *Stamina* 18, filamentis 1–1·5 mm. longis, antheris 1 mm. longis. *Ovarium* inchoatum, glabrum.

Krabin, Aranya, under 50 m., bamboo forest, *Kerr* 19325.

Diospyros Putii *Fletcher* [Ebenaceae] ; *D. castaneae* (Craib) Fletcher* affinis, sed calyce ♀ alte lobato nec truncato, foliis chartaceis maioribus differt.

Arbor ; ramuli teretes, primo puberuli mox glabrescentes, brunnei vel cinereo-brunnei, lenticellis numerosis elevatis praediti. *Folia* elliptica vel ovato-elliptica, apice obtusa vel subrotundata, basi cuneata, 10–26 cm. longa, 6–12 cm. lata, chartacea, utrinque brunnea subtus pallidiora, glabra, costa utrinque sparse puberula supra subconspicua vel leviter impressa subtus valde prominente, nervis lateralibus 10–12-paribus patentibus parallelis supra impressis subtus prominulis intra marginem arcuatim junctis, nervis transversis paucis irregularibus, nervulis numerosis pagina superiore impressis pagina inferiore subprominulis, margine integra, petiolo 1 cm. longo supra apicem versus canaliculato primo puberulo suffulta. *Flores feminei* axillares, singuli, e ramulis junioribus orti ; pedicelli 1 cm. longi, crassi, dense pilosi. *Calyx* intus et extra sericeus ; tubus 1·5 mm. longus ; lobi 4, late ovati, 8–10 mm. longi, 6 mm. lati, apice acuti vel obtusi. *Corollae* tubus 4–5 mm. longus, extra basi glaber, superne pilosus ; lobi 4, subrotundati, 5 mm. diametro, revoluti, ciliati. *Ovarium* subglobosum, dense aureo-pilosum, 6-loculatum, loculis uniovulatis ; stylus brevis, trilobatus.

Korat, Ban Chum Seng, *Put* 2834.

Diospyros saxosa *Fletcher* [Ebenaceae] ; *D. ovalifoliae* Wight affinis, sed albumine radiatim striato differt ; nec non *D. cauliflorae* Blume affinis, sed fructibus 1- nec 4–8-spermis differt.

Arbor parva, circiter 5 m. alta (ex *Kerr*) ; ramuli teretes, primo ferrugineo-puberuli, mox glabrescentes, cortice brunneo vel griseo-brunneo paucilenticellato obtecti. *Folia* ovata vel ovato-oblonga, apice obtusa, basi rotundata vel subcuneata, 6–12 cm. longa, 2–5 cm. lata, coriacea, utrinque brunnea subtus pallidiora viridi-tincta, pagina superiore glabra nitida, inferiore juventute adpresse pubescente demum plus minusve glabrescente, costa supra impressa subtus prominente, nervis lateralibus 8–10-paribus supra impressis

* *Vide supra*, p. 382.

vel subconspicuis subtus prominulis parallelis intra marginem arcuatim junctis, reticulatione laxa supra obscura vel leviter subconspicua subtus subprominula, margine integra, petiolo 5–7 mm. longo supra plano apicem versus canaliculato ferrugineo-puberulo vel glabro suffulta. *Flores masculi* in cymis axillaribus breviter pedunculatis dispositi. *Calyx* intus et extra aureo-pilosus ; tubus 1 mm. altus ; lobi 4, late ovati, 2 mm. longi et lati, valde ciliati, apice acuti. *Corolla* sparse puberula ; tubus 4 mm. altus ; lobi 4, late ovati, 2 mm. longi et lati, apice obtusi vel subacuti, leviter reflexi, basi imbricati, dorso pilosi. *Stamina* 16, per paria connata, filamentis 1·5 mm. longis glabris, antheris 4 mm. longis apice acutis. *Ovarium* obsoletum, conspicue pilosum. *Flores feminei* deficientes. *Fructus* subsessilis ; calyx extra adpresse ferrugineo-pilosus, intus dense ferrugineo-sericeo-pilosus ; tubus 2–3 mm. altus ; lobi 4, late triangulares, apice obtusi vel subrotundati, 5 mm. lati et longi, margine recurvi ; bacca rubra (ex *Kerr*), succulenta, globosa, 1·5–2 cm. diametro, minute apiculata, apice sparse aureo-pilosa, 1-sperma ; semina elliptica, 10 mm. longa, 7 mm. diametro, nigra, nitida, albumine radiatim striato.

Ban Den, Kao Sang, c. 100 m., limestone rocks, *Kerr* 4540. Takli, *Put* 2119. Korat, Chantûk, Tachang, c. 400 m., rocky limestone hill, *Kerr* 9987. Korat, Ban Tachang, *Put* 3492. Chantabun, Tamun, c. 200 m., evergreen forest, *Kerr* 9704. Near Sriracha, c. 10 m., *Mrs. D. J. Collins* 1507 (*type*). Chiabadan, Dong Paya Yen, c. 100 m., evergreen forest, *Kerr* 8014. Prachuap, c. 50 m., dry evergreen forest, *Kerr* 21573. Prachuap, Sam Roi Yawt, *Put* 2490. Chumpawn, Siepyuan, *Put* 967. Champawn, Bang Son, *Haniff & Nur* 4233. Lower Siam-Punjab, *Haniff & Nur* 3968.

The collections enumerated represent a species varying rather considerably in hair consistency and permanence and in leaf texture.

Diospyros scalariformis *Fletcher* [Ebenaceae] ; *D. brachiatae* King et Gamble affinis, sed nervis lateralibus paucioribus, pedunculis pedicellisque brevioribus, calyce haud ad basin lobato, corollae lobis minoribus, staminum filamentis longioribus differt.

Arbor circiter 20 m. alta (ex *Kerr*) ; ramuli teretes vel obtuse quadrangulares, glabri, cortice brunneo paucilenticellato obtecti. *Folia* elliptica vel oblongo-elliptica, apice attenuata, obtusa, basi breviter cuneata, 10–22 cm. longa, 2·5–7 cm. lata, chartacea vel chartaceo-coriacea, utrinque brunnea, glabra, costa supra conspicua subtus prominente, nervis lateralibus 7–10-paribus supra subconspicuis subtus prominulis parallelis intra marginem anastomosantibus, nervis transversis numerosis parallelis scalariformibus subtus subprominulis, reticulatione laxa, margine integra recurva, petiolo 5–8 mm. longo crasso rugoso supra valde canaliculato glabro suffulta. *Flores masculi* in cymis axillaribus dispositi ; pedunculi

pedicellique breviter fulvo-pilosi. *Calyx* extra fulvo-pilosus; tubus 2–2·5 mm. altus, intus glaber; lobi 4–5, triangulares, 2·5–3 mm. longi, 2 mm. lati apice acuti, intus sparse pubescentes. *Corolla* alba (ex *Kerr*), extra aureo-sericeo-pilosa, tubulosa, apice constricta; tubus 10 mm. longus, 4·5 mm. diametro; lobi 5, imbricati, late ovati, 4–4·5 mm. lati, 4 mm. longi, apice rotundati. *Stamina* 18, per paria connata, antheris 2·5 mm. longis apice apiculatis minute aristulatis, filamento communi 1·5 mm. longo, filamentis partialibus 1·5–2 mm. longis. *Ovarium* inchoatum, subglobosum, 1·5 mm. diametro, dense aureo-pilosum.

Surat, Sawng Pi Nawng, c. 200 m., evergreen forest, *Kerr* 12393.

Diospyros striata *Fletcher* [Ebenaceae]; *D. dumetorum* W. W. Sm. affinis, sed fructibus striatis semper 6- nec 1–4-spermis differt.

Arbor; ramuli graciles, teretes, primo griseo-pubescentes mox glabrescentes, cortice brunneo vel cinereo-brunneo paucilenticellato obtecti. *Folia* ovata vel sublanceolata, apice obtusa, basi cuneata, 2–5 cm. longa, 1–2 cm. lata, textura coriacea, utrinque brunnea, pagina superiore adpresse pubescente, inferiore dense fulvo-tomentosa, costa supra leviter impressa subtus prominente, nervis lateralibus 4-paribus supra obscuris vel impressis subtus subconspicuis parallelis intra marginem arcuatim junctis, nervulis paucis supra leviter impressis subtus obscuris, margine integra recurva, petiolo 3 mm. longo dense fulvo-tomentoso suffulta. *Flores* deficientes. *Fructus* subsessiles; calyx usque ad basin 4-partitus, segmentis intus et extra leviter adpresse pilosis ovatis 5–7 mm. longis 3–4 mm. latis apice acutis recurvis; bacca subglobosa, 8–10 mm. diametro, breviter apiculata, leviter fulvo-pilosa vel glabra, 6-striata, 6-loculata, loculis 1-spermis; semina atra, minute rugosa, 8 mm. longa, 4 mm. lata, lateraliter cuneatim compressa, facie distali convexa.

Doi Chiengdao, *Put* 362.

Although neither male nor female flowers are available, the six grooves on the fruit seem clearly to distinguish this plant from all others.

Diospyros subviridis *Fletcher* [Ebenaceae]; *D. viridi* Craib affinis, sed corolla calyceque brevioribus, nervis nervulisque utrinque magis prominulis differt.

Arbor circiter 30 m. alta (ex *Kerr*); ramuli quadrangulares, glabri, cortice cinereo paucilenticellato obtecti. *Folia* lanceolata vel oblongo-lanceolata, apice attenuata, obtusa, basi cuneata, 6–12 cm. longa, 1·5–2·5 cm. lata, chartacea, utrinque brunnea, glabra, costa supra subconspicua vel leviter impressa subtus prominente, nervis lateralibus 12-paribus utrinque prominulis parallelis intra marginem arcuatim junctis, nervis transversis numerosis irregularibus, reticulatione utrinque subprominula, margine integra conspicue recurva, petiolo 7–10 mm. longo supra plano leviter canaliculato glabro rugoso suffulta. *Flores masculi* in cymis axillaribus breviter

pedicellatis vel subsessilibus dispositi ; pedunculi 2–6 mm. longi, crassi, glabri. *Calyx* coriaceus, extra glaber vel sparse adpresse pubescens, cupularis, 3·5–4 mm. longus, intus glaber, truncatus vel breviter dentatus. *Corolla* alba (ex *Kerr*), extra glaber ; tubus 3·5 mm. longus ; lobi 4, rotundati, 4 mm. longi et lati, basi valde imbricati. *Stamina* 30, per paria connata vel in fasciculos triandros disposita, antheris 3–4 mm. longis sessilibus vel subsessilibus. *Ovarium* inchoatum, inconspicuum, glabrum. *Flores feminei* deficientes.

Satul, Kao Keo Range, c. 500 m., evergreen forest, *Kerr* 14572.

Diospyros trimera *Fletcher* [Ebenaceae] ; *D. dumosae* King et Gamble affinis sed nervis lateralibus numerosioribus, pedunculis pedicellisque florum masculorum longioribus, calycis lobis minoribus angustioribus marginibus haud undulatis differt.

Arbor ad 20 m. alta (ex *Kerr*) ; ramuli graciles, teretes vel obtuse quadrangulares, primo puberuli mox glabri, cortice brunneo vel cinereo-brunneo obtecti. *Folia* elliptica vel oblonga, apice attenuata, obtusa, basi cuneata vel subrotundata, ad 22 cm. longa, ad 7 cm. lata, chartacea, utrinque brunnea vel viridi-brunnea, glabra vel nunc subtus sparse adpresse pubescens, nervis supra leviter impressis, costa subtus prominente, nervis lateralibus 10–12-paribus, subtus prominulis parallelis intra marginem arcuatim junctis, nervis transversis subconspicuis parallelis, reticulatione laxa supra obscura, margine integra undulata leviter recurva, petiolo 4–6 cm. longo supra canaliculato leviter piloso suffulta. *Flores masculi* in cymis axillaribus breviter pedicellatis dispositi ; pedunculi pedicellique ferrugineo-pilosi. *Calyx* usque ad basin 3-partitus, segmentis ovatis vel ovato-lanceolatis 2·5–3 mm. longis 2 mm. latis apice acuminatis extra aureo-pilosis intra glabris margine ciliatis. *Corolla* alba (ex *Kerr*) ; tubus 9 mm. altus, extra basi glaber, superne cinereo- vel fulvo-pubescens ; lobi 3, oblongi, 6 mm. longi 4 mm. lati, apice rotundati, intus glabri, extra leviter aureo-pubescentes. *Stamina* 12, per paria connata, breviter aristata, filamento communi ad 0·5 mm. longo, filamentis partialibus 1–2·5 mm. longis. *Ovarium* inchoatum, apice pilis paucis aureis ornatum.

Surat, Yanyao, c. 50 m., evergreen forest, foot of limestone hill, *Kerr* 18197. Puket, Kamala, c. 100 m., by stream in evergreen forest, *Kerr* 17418. Krabi, Tambon Kao Panom, c. 100 m., by stream in evergreen forest, *Kerr* 18654 (*type*).

Diospyros Winitii *Fletcher* [Ebenaceae] ; ab affini *D. Kerrii* Craib foliis pilosioribus, floribus maioribus, staminibus apiculatis differt.

Arbor ad 18 m. alta (ex *Kerr*) ; ramuli teretes vel quadrangulares, primo ferrugineo-tomentelli, mox glabrescentes, cortice brunneo vel cinereo obtecti. *Folia* leviter ovata vel elliptica, apice acuminata, subacuta, basi rotundata vel subcuneata, 8–15 cm. longa, 3–6 cm. lata, chartacea, supra brunnea vel cinerea, subtus brunnea, pagina

superiore primo ferrugineo-pubescente mox glabra, inferiore ferrugineo-pilosa, costa supra subconspicua subtus prominente, nervis lateralibus 4–6-paribus subtus prominulis parallelis intra marginem arcuatis, nervulis transversis nervulisque obscuris, margine integra juventute conspicue ciliata, petiolo 5–10 mm. longo supra plano indumento ramulorum munito suffulta. *Cymae* ♂ axillares, pauciflorae, pedunculo communi 5 mm. longo indumento simili induto suffultae. *Calycis segmenta* 4, subrotundata, 4 mm. longa et lata, apice acuta, extra ferrugineo-pilosa, intra glabra, valde ciliata. *Corolla* alba (ex *Kerr*), urceolata, extra leviter fulvo-pubescens, intra superne cinereo-pubescens; tubus 6·5-7 mm. longus; lobi 4, ovati vel elliptico-oblongi, 3·5–4 mm. longi, 3 mm. lati, acutiusculi, sub anthesin recurvi. *Stamina* 16, per paria connata, filamento communo 2–2·5 mm. longo glabro, filamentis partialibus 0·5 mm. longis albo-hirsutis, antheris 2·5–3·5 mm. longis lanceolatis apice apiculatis basi albo-hirsutis. *Ovarium* inchoatum, subglobosum, 2 mm. diametro, apice pilis paucis albis ornatum. *Flores feminei* deficientes. *Fructus* succulentus, globosus, 2–2·5 cm. diametro, 4-loculatus, loculis 1-spermis. *Semina* 13 mm. longa, 7 mm. lata, fabiformia.

Lampang, Hui Pan Chen, c. 210 m., *Winit* 1257. Border of stream, *Winit* 1462. Nan, Nam Pieng, c. 440 m., evergreen forest, *Winit* 1778. Nakawn Tai, c. 200 m., evergreen forest, *Kerr* 5859 (*type*).

XL—THE TAXONOMIC POSITION OF RHYNCHOCALYX.

T. A. Sprague and C. R. Metcalfe.

The new genus and species described in Hook. Ic. Pl. t. 2348 (1894) by Oliver under the name *Rhynchocalyx lawsonioides* was assigned by him without hesitation to the family Lythraceae. Far from having any doubts as to the family, he thought it necessary to justify the creation of a new genus for its reception: "The isomerous stamens, singly opposed to the petals, and the bilocular compressed ovary with numerous horizontal axile ovules, I think, entirely justify its discrimination as a new generic name. The general facies of the plant is quite that of *Lawsonia inermis*." Koehne, in Engl. Pflanzenr. IV. 216 (Lythraceae), 272 (1903), however, excluded it from the Lythraceae, with the following observations: "Genus a Lythraceis diversum propter stamina 5 vel 6 epipetala exacte cum petalis inserta ovulaque uniseriata horizontalia in ovarii loculamenta utroque. Si loculamenta essent uniovulata, plantam Rhamnaceis adnumerares."

As the result of an enquiry addressed to Kew, the taxonomic position of *Rhynchocalyx* has been re-investigated. Comparison of *Rhynchocalyx* with the descriptions of Lythraceae given in Benth. et Hook. f. Gen. Pl. **1**, 773 (1867) and Engl. Pflanzenr. IV. 216, Lythraceae, 2 (1903) show the following points of agreement: Flowers hexamerous. Calyx-tube patelliform; lobes valvate.

Petals unguiculate, crumpled. Disc adnate to the calyx-tube. Filaments incurved. Anthers with a thickened connective, and reniform-recurved after dehiscence. Ovary free; style simple; stigma punctiform. Ovules numerous, horizontal. Leaves opposite, exstipulate, entire. Inflorescence 'paniculate' (*i.e.* cymose).

Koehne excluded *Rhynchocalyx* from the Lythraceae on two grounds: that the stamens are in a single whorl opposite the petals, and the ovules 'uniseriate' in each loculus.

The first ground for exclusion is hardly tenable, since certain undoubted Lythraceae, e.g. *Diplusodon hexander* DC., also have a single whorl of stamens opposite the petals. The sole remaining difference from the Lythraceae, as delimited by Koehne, is the 'uniseriate' arrangement of the ovules. Though the ovules form what superficially appears to be a single vertical row, they are actually *attached* in two perfectly distinct vertical rows. Each ovule (except the lowest) extends horizontally into the space between two ovules of the opposite row, so that all the ovules are almost exactly superposed, the distal half* of each ovule covering the proximal half of an ovule of the other series, and its proximal half covering the distal half of the other ovule.

Lagerstroemia indica has two vertical rows of ovules in each loculus, according to Wight, Ill. **1**, t. 86, fig. 7; and in the genus *Cuphea* the total number of ovules is frequently reduced to 3 or 2. The sole peculiarity of *Rhynchocalyx* consists in the ovules of each row growing horizontally between those of the opposite row. Its exclusion from the Lythraceae thus appears to be entirely unjustified, so far as external morphological characters are concerned.

In Koehne's classification *Rhynchocalyx* should be placed in the subtribe *Lagerstroemiinae*, next to *Lawsonia*, with which it agrees, not only in facies, but in a variety of technical characters, including the nature of the anthers. The conspicuously unguiculate, irregularly laciniate petals approach those of certain species of *Lagerstroemia*, the only other genus of *Lagerstroemiinae*.

Anatomy.—There is a general similarity in the stem structure of *Rhyncocalyx lawsonioides* and *Lawsonia inermis*, although really distinctive features indicating a close relationship of the two genera to one another and sharply defining them from other unrelated plants were not observed. There is a solid pith including a few large stone cells in both genera. The distribution of the vessels in the xylem is similar but by no means identical in the two species. The bordered pits in the vessel walls are similar and have horizontal apertures. The short petiole to the leaf in both genera is provided with a single, horse-shoe-shaped vascular strand. Uniseriate, and partly biseriate, heterogeneous rays are also common to both species.

It is not possible to make certain whether internal phloem is present in the herbarium material available, as the phloem cells,

* The expression "distal half" is used for the half of the ovule including the raphe.

being very delicate, are somewhat disorganised in dried material. A small-celled tissue which might represent internal phloem was, however, seen in both genera.

These characters, taken in conjunction with the external morphological similarities seem to indicate that the two genera are closely related to one another.

Rhynchocalyx lawsonioides was collected by John Medley Wood (No. 3124) at the edge of bush near Murchison, Natal, where he found it in flower on April 30, 1884. The species has apparently never been collected again, and the fruit and seeds are still unknown. It is hoped that the publication of this article may lead to its rediscovery.

XLI—THE GENUS OCTOLOBUS WELW. J. Hutchinson.

Some genera of *Sterculiaceae* show a curious association of characters, with often a mixture of quite primitive, or at least regarded by many botanists as primitive, and highly advanced types of floral structure. *Octolobus*, a small genus of low trees from the forests of West Africa, falls under this category.

There is at least one very primitive feature, *i.e.*, a large number of quite free carpels spirally arranged. The remainder of the characters are highly advanced. The leaves are unifoliolate, as shown by the presence of a pulvinus at the top of the petiole; the unisexual flowers are solitary and surrounded at the base by an involucre of bracts, indicating reduction from an inflorescence of several flowers; the calyx is gamosepalous and of course valvate as in all *Sterculiaceae* and closely allied families, and it is coloured to compensate for the absence of petals. In addition the stamens are completely united into a column, the anthers being connivent into a ring. The first character, therefore, harks back as far as the *Annonaceae* and *Dilleniaceae*, the remainder reaching the degree of evolution as found in some *Euphorbiaceae*.

The following key should be regarded as tentative until more material of this highly interesting genus is available.

Octolobus Welw. ex Benth. et Hook. f. Gen. Pl. **1**, 982 (1867); Welw. in Trans. Linn. Soc. Lond. **27**, 17 (1869); K. Schum. in Engl. & Prantl, Pflanzenfam. **3**, 6, 43 (1890), et in Engl. Monogr. Afr. Pfl. Sterculiaceae, 99, t. XI (1900).

Key to species of Octolobus.

Leaves very abruptly acuminate, rounded at the base and long-petiolate, broadly elliptic to obovate-elliptic ..... 1. *heteromerus*

Leaves gradually to less abruptly acuminate, more or less narrowed to the base, oblanceolate to narrowly obovate:

Leaves glabrous below; petiole glabrous or at most slightly pubescent:

Calyx broadly campanulate from the base, densely and rather roughly stellate-tomentose outside..... 2. *spectabilis*

Calyx rather narrowly cylindric in the lower half, suddenly expanded into the limb, shortly and rather laxly stellate-tomentellous outside.....3. *angustatus*

Leaves densely rusty-villous on the lower part of the midrib and sometimes the lateral nerves below, obovate or obovate-oblong ; petiole densely villous ; imperfectly known species 4. *Zenkeri*

1. Octolobus heteromerus *K. Schum.* in Notizbl. Bot. Gart. Berlin, **2**, 306 (1899). *O. grandis* Exell in Journ. Bot. 1927, Suppl. 37.

CAMEROONS : Bipinde, in shady places of the forest at Lokundje, Dec., *Zenker* 1579 (type).

ANGOLA : Cabinda Distr., *Gossweiler* 6011.

2. O. spectabilis *Welw.* in Trans. Linn. Soc. **27**, 18, t. 6 (1869) ; Hiern in Cat. Afr. Pl. Welw. **1**, 84 (1896).

GABON : Nyanga region, *Le Testu* 1845.

ANGOLA : Cuanza Norte Distr. ; Barranco da Pedra Songoe, Pungo Andonga, ♂ & ♀ fls. Jan., fr. Apr., *Welwitsch* 1202 (type in Brit. Mus. Herb.).

3. Octolobus angustatus *Hutch.* sp. nov. affinis *O. spectabili* Welw. sed floribus sub anthesi minoribus, bracteis majoribus rotundato-obovatis, calycis tubo dimidio inferiore cylindrico in lobis 8 subito expanso differt ; ab *O. Zenkeri* Engl., foliis infra glabris distinguitur.

Frutex vel arbor parva usque ad 7 m. alta ; ramuli juniores tomentosi, annotini cinerei, glabrati. *Folia* oblanceolata vel elliptico-obovata, ad basin sensim angustata, late et sensim acuminata, 6–15 cm. longa, 2·5–6 cm. lata, utrinque glabra ; costa utrinque prominens ; nervi laterales utrinsecus 7–9, arcuati, intra marginem conjuncti ; petioli plerumque breves sed interdum ad 3 cm. longi, apice pulvinati ; stipulae subulato-filiformes, mox deciduae. *Flores* ♂ flavi, axillares, sessiles ; bracteae subpersistentes, rotundato-obovatae, ad 7 mm. longae, conspicue nervosae et puberulae. *Calyx* 3 cm. longus, extra breviter stellato-tomentellus ; tubus cylindricus, 6–7 mm. diametro, 1 cm. longus, lobis 8 oblongo-lanceolatis marginibus valde undulatis intra crebre puberulis. *Columna staminalis* glabra, stipite 5 mm. longo, antheris 4 mm. longis. *Carpella* juniores numerosa, 5–6-ovulata, tomentosa, stigmate unilaterale spatulato verruculoso coronato, matura rubra, stipitata, oblique ellipsoidea, 2–2·5 cm. longa, 1·5 cm. lata, sicco minute tomentella et leviter nervosa, stipite 1–1·5 cm. longo. *Semina* 5–6, nigra, nitida.

GOLD COAST : Kwahu Prasu, small tree 20 ft., in undergrowth of closed forest, Feb. 1929, *C. Vigne* 1602 (type in Kew Herb.) ; South Fomang Su Reserve, fls. yellow, *Vigne* 2674 (Oxford For. Herb.) ; Shasha Reserve, small tree or shrub, *Lancaster* 14 (Oxford For. Herb.). Akotui, Eastern Province, Oct., *Vigne* 4028 ; Aketewia, fruits red, with edible black seeds, Nov., *Vigne* 4268.

This closely resembles *O. spectabilis* Welw., the type species of the genus from Angola and Gabon, but the calyx of our plant is more finely tomentellous, and when open and just before opening the tube is rather narrowly cylindric compared with the broadly campanulate tube of *O. spectabilis*.

Vigne states that the Ashanti name is *Afinafi*, the Krobo name *Kobina-nua* and that the wood is hard, heavy and yellow.

4. O. Zenkeri *Engl.* in Engl. Bot. Jahrb. **45,** 325 (1911).

CAMEROONS : Bipinde, fr. Mar., *Zenker* 3742 (type).

This is an imperfectly known species, known so far only by the type specimen. It may be at once distinguished by the densely villous petioles and woolly midrib below.

Flowers are much desired to confirm its position in this genus.

XLII—MISCELLANEOUS NOTES.

Retirement of Curator.—The retirement of Mr. John Coutts from the post of Curator on August 31st, 1937, under the age limit, terminates, to our great regret, a period of long and valuable public service at the Royal Botanic Gardens.

Mr. Coutts entered Kew as a student gardener on November 2nd, 1896, and was promoted to the position of Sub-Foreman on October 3rd, 1898. He left Kew on September 15th, 1900, on his appointment as Head Gardener to Sir Thomas Dyke Acland, Bart., at Killerton. Here he spent eight and a half years until he was recalled to Kew to take up the position of Foreman of the Decorative Department, to which he was appointed on March 25th, 1909. The title of the post was changed to that of Assistant Curator in June 1922.

Mr. Coutts was appointed Deputy Curator on May 21st, 1929, and succeeded the late Mr. T. W. Taylor as Curator on March 5th, 1932.

He was made an Associate of Honour of the Royal Horticultural Society in 1930. The Society also awarded him the Victoria Medal of Honour in Horticulture in 1934, and the Veitch Memorial Medal in 1937.

In addition to Mr. Coutts's many contributions to horticultural knowledge and to the valuable assistance he has given both at the great Ghent Floralies exhibition in 1933 and in connexion with the Empire exhibit at the Coronation Chelsea Show of the Royal Horticultural Society this spring, mention must be made of the great interest he has always taken in the welfare of the student gardeners and the encouragement he has given them in their literary and other pursuits. Many generations of Kew men will retain in grateful memory the help and sympathy that they received from Mr. Coutts. In bidding him farewell, we offer to him and to Mrs. Coutts our best wishes for many years of happiness and enjoyment of their well-deserved leisure.

Cocculus grandifolius.—In a paper in Buchner's Repertorium für die Pharmacie, **36** (1830), Martius described three new species of Brazilian *Menispermaceae* which were used in the fabrication of poison by Amazonian Indians, viz. *Cocculus Imene* (p. 341), *C. grandifolius* (p. 345) and *C. amazonum* (p. 349). Of these names only the last is recorded in the Index Kewensis as having been published in this paper (erroneously attributed to Herberger), while no mention is made either of *C. grandifolius* or of *C. amazonum* in Eichler's account in Martius' Flora Brasiliensis, **13,** pars 1 (1864), and in Diels' monograph of the family in Engler's Pflanzenreich (1910). *C. Imene* is represented by a type specimen and is the basis of *Abuta Imene* (Mart.) Eichl.

When Martius later produced in "Flora" his long papers of notes on the Brazilian specimens in his herbarium, he assembled descriptions of the Brazilian species of *Cocculus* known to him: see Flora, **24,** 2 Beibl. 42–46 (1841). Eleven new species of *Cocculus* were described, among them *C. Imene*, but no mention was made either of *C. grandifolius* or of *C. amazonum*, and no reference was given to the descriptions which had appeared in Buchner's Repertorium. Dr. Harold King, who recently called the writer's attention to this matter, has made enquiries from Prof. L. Diels of Berlin-Dahlem, and the latter writes that he has never seen material of *C. grandifolius* and *C. amazonum*, and that no specimens with these names are to be found in Martius' Herbarium at Munich.

Comparison of the descriptions of *C. grandifolius* and *C. amazonum* with those of species described by Martius in "Flora" fails to identify *C. amazonum* satisfactorily. There can, however, be no doubt about the identity of *C. grandifolius*. The short Latin description in Buchner's Repertorium is incorporated almost word for word in that of *C. laevigata* Mart. (a species with unusually large leaves, 8–10 inches long and 4 inches broad) and corresponds with no other. It is evident that Martius, in describing *C. laevigata*, was elaborating the description of his *C. grandifolius* and substituting a new specific epithet. Now the type of *C. laevigata*, collected in November at Manaqueri near Barra (Manáos), Rio Negro, has been examined by Prof. Diels, who has reduced the species to *Abuta concolor* Poeppig et Endl., of which he has also seen the type material. It therefore becomes evident that, since Martius' description of *Cocculus grandifolius* in 1830 antedates that of *Abuta concolor* by some years, the following new combination is required for this well-known species: **Abuta grandifolia** (*Mart.*) *Sandwith*, comb. nov.—*Cocculus grandifolius* Mart. in Buchner, Repert. Pharm. **36,** 345 (1830). *Abuta concolor* Poepp. et Endl. Nov. Gen. et Sp. **2,** 64, t. 188 (1838); Diels, Mon. Menisp., in Engl. Pflanzenreich, **4,** 94, p. 197 (1910). *Cocculus laevigata* Mart. in Flora, **24,** 2 Beibl. 45 (1841).

N. Y. SANDWITH.

Canadian Woods.*—A number of timbers reach this country from Canada, among the more important being Douglas fir, *Pseudotsuga taxifolia* (Poir.) Britt., western red cedar, *Thuja plicata* D. Don, and yellow cedar, *Chamaecyparis nootkatensis* Sudw., among the softwoods, and basswood, *Tilia glabra* Vent., yellow birch, *Betula lutea* Michx. and rock maple, *Acer saccharum* Marsh., among the hardwoods. In the present work a chapter is devoted to brief descriptions of the commercially valuable timbers of the Dominion, together with lists of the uses to which each is suited. The information given in these short monographs is supplemented by specific data on strength, weight, shrinkage, hardness and other characteristics for each timber, presented in the form of a table in the appendix.

The description of the timbers, however, is but one of the aspects of this many-sided work, the scope of which is indicated by the subjects allotted a chapter. These include the structure of wood, its mechanical and physical properties, decays and stains, preservative treatment, pulp and paper, and the chemical utilisation of wood. In addition, the introductory chapter contains a dictionary of terms used in the lumber industry, and tables in the appendix list safe working stresses for timber columns, beams and joists, weight per lineal foot and other data. The various branches of the work are dealt with individually by experts on the staff of the Forest Products Laboratories of Canada. The treatment is clear but of a rather general type imposed by limitations of space. The liberal and up-to-date bibliography at the end of each chapter indicates sources of more detailed information for those who wish to follow up a special subject. The book is illustrated by photographs and diagrams. It should be of value as a reference work for timber producers and users in this country.

R. MELVILLE.

The Useful Plants of West Tropical Africa.†—In the introduction to the "Flora of West Tropical Africa," which has recently been completed at Kew, the publication of an appendix or economic supplement to deal with economic uses and vernacular names was indicated. This has now appeared. Such a supplement is a new departure in connexion with the publication of a Flora and its compilation was undertaken in the belief that it would furnish a valuable link between botanical research and the work of those who are concerned with the administration, welfare and economic development of the territories concerned.

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* "Canadian Woods, their Properties and Uses." By T. A. McElhanney and Associates. Dept. of the Interior, Canada. Ottawa, 1935. Pp. xv + 345. Price $1·50 bound, $1 unbound, from the King's Printer, Ottawa.

† By J. M. Dalziel, M.D., B.Sc., F.L.S., late of the West African Medical Service; being an Appendix to the Flora of West Tropical Africa, by J. Hutchinson and J. M. Dalziel. Crown Agents for the Colonies, London, 1937. Pp. 612. Price 18*s.* net.

Thanks to Dr. Dalziel's long service in the West African Colonies and to his knowledge, not only as a Doctor of Medicine but also as the author of " A Hausa Botanical Vocabulary " and a botanist, he has been able to get together a vast amount of information about the uses made by the natives of their indigenous plants, which should be of great historical and practical value.

It may be thought that much of the ground covered in this Appendix may have been traversed already in Holland's " Useful Plants of Nigeria " (Kew Bulletin, Additional Series 9). This, however, is not the case, for there is no repetition of the information or of the references given by Holland.

A special feature of the work is the large number of vernacular names of plants that are recorded. These, estimated to exceed twenty thousand, occur throughout the text with indications of the country or tribe to which they belong, and are also listed in a separate index. As the author points out, great pains were taken to verify these. Evidence of the labour that has been devoted to this part of the book is afforded by the fact that in the case of the oil-palm not less than a hundred and fifty vernacular names are recorded. In view of the increased interest that has arisen in the study of native languages in West Africa in recent years, these vernacular names will no doubt be regarded by workers in various fields as a valuable feature of the book.

A good deal of native folk lore is to be found within its pages, and popular beliefs and ways of thinking about plants and their influence, real or supposed, on human behaviour and welfare. This is to be expected when it is remembered that so many of the plants referred to have medical uses and much of native medicinal practice cannot easily be separated from magic and superstition.

As much of the area covered by the Flora is French territory it is fortunate that the work of Dr. A. Chevalier, Professor in the Muséum d'histoire naturelle, Paris, and of his collaborators, covering the whole of French West Africa, has been available without reserve.

The serious student will appreciate the references to literature that are given freely in the text and which are additional to the bibliography of major works at the commencement of the volume. The general arrangement of families and species follows that of the Flora, and the three separate indexes—scientific names, common names and vernacular names—should render the work easy of reference to botanists and others alike. Apart from purely indigenous plants many other economic or crop plants that occur or are grown in other parts of the tropics besides West Africa are included. Interest in the work should not therefore be limited to those resident in or associated with West Africa.

Floral Morphology.—What is frequently referred to as the "orthodox" interpretation of flower morphology has been vigorously attacked from several diverse standpoints in recent years. Most morphologists, and, certainly for descriptive purposes, most taxonomists, have accepted a flower as a modified stem (or stem-branch) bearing modified leaves (tepals, stamens, and carpels), whose number and relative position can be determined by the study of "external" morphological features such as independence, number of lobes, number of pollen-sacs, number and position of loculi, placentae, and stigmata, etc. It is also generally agreed that the close aggregation of the floral parts on a short, often very short, and frequently more or less modified receptacle can be correlated with a wide variety of cohesion, adhesion, reduction, branching, and other structural peculiarities, which often, in addition to shape, size, texture, and colour, distinguish floral from vegetative organs. The orthodox theory, especially developed by De Candolle, is very clearly expressed in Asa Gray's Structural Botany, vol. 1, chapter 6 (London, 1887). On the whole it has served well as a basis for expressing the very wide range of flower structures which botanists have had to describe, compare, and classify. The stamens and carpels, usually regarded as microsporophylls and megasporophylls, more often than the sepals and petals, sometimes show characters which, taken as a whole, require many modifications of any simple generalized scheme. The gynoecium, in syncarpous flowers at least, must involve the apex of the torus—i.e., on the orthodox view, a stem apex. Recent research and discussions have been particularly concerned with the gynoecium.

For about fifteen years Miss Saunders has made a detailed study of the flower structure, with special reference to the gynoecium, of a wide range of families. The results of her investigations have been published in over 30 papers in some half-a-dozen scientific periodicals. The publication of a summary of her results and interpretations in book form* will be welcomed by a wide circle of botanists, the more so that it is issued in a very acceptable form at a modest price. It should have a wide circulation amongst all who are interested in Angiosperm morphology and systematics, whether as research workers, teachers, or college students.

In an Introduction Miss Saunders explains the general conclusions to which her work has led her. As is generally known, she lays considerable stress on the vascular system of the flower, and especially on the organization of the strands from the central cylinder. Sepals, petals, stamens and carpels, like foliage leaves, ordinarily have a main vascular strand—the midrib. The origin and subsequent arrangement of the strands depends largely on time and space conditions, and the regularity of pattern may be

* "Floral Morphology. A New Outlook with special reference to the Interpretation of the Gynaeceum." By E. R. Saunders, F.L.S. Vol. 1. W. Heffer & Sons, Ltd., Cambridge, 1937. Pp. viii + 132. Price 3*s.* 6*d.*

more or less masked by the formation of compound bundles (trunk cords) and other disturbances of the normal basic rhythm of alternation.

Partly on the vascular structure of the gynoecium of the many flower types examined, two main kinds of carpels are distinguished : the valve and the consolidated, the latter appearing in two forms, the solid and the expanded (semi-solid and pseudo-valve). Most flowers have both types of carpel in alternating whorls, and even many gynoecia usually described as apocarpous are reinterpreted as syncarpous and composed of two kinds of carpel. The general principles with their implications serve to bring many facts into line. It is claimed that " they dispose of many morphological fictions, including hypothetical splittings and unions, hypothetical suppressed whorls, ' commissural ' stigmas, ' false ' partitions, ' free-central ' placentation and epigyny as traditionally interpreted, while ' parietal ' and ' axile ' placentation and ' septicidal ' dehiscence now have an altered significance. They provide an explanation of obdiplostemony, various forms of fruit dehiscence, and many other hitherto unexplained features."

In the later parts of the book 39 selected families are examined primarily from the standpoint of the problems presented by particular types of floral construction. Under each family a number of illustrative types are named and certain details given concerning them. The descriptive details are, of course, given in terms of the general principles outlined in the first part (Introduction). It is, however, interesting to note that, apart from the accepted polymorphism of the carpels and the important implications of this theory, there is very little that could not have been written by an orthodox morphologist or taxonomist. This is not the place to discuss the pros and cons of the theory of carpel polymorphism and of other still more heterodox theories of flower morphology. Enough has, perhaps, been said to show that Miss Saunders has presented such facts and interpretations as must be taken very fully into consideration by all who have to study that most characteristic Angiospermous structure, the flower.

Miss Saunders's Introduction is not very easy reading. In the volume as a whole the inclusion of more than six figures (that on p. 94 should be fig. 6 and not fig. 5) would have been a boon to many readers. The general absence of figures is of less importance to those who can consult the original papers, to which references are freely given, and of which this book is in many ways a most admirable and convenient partial summary.

W. B. TURRILL.

A New Indian Local Flora.*—Though a good forest Flora of the Punjab has been published by R. N. Parker, a general flora for the Province is still lacking, so that a detailed compilation for the Lahore District is very welcome. Indeed, a large number of such local Floras are needed for the use of students in all branches of botanical knowledge, and but few have yet appeared.

Prof. Kashyap had written the descriptions from *Ranunculaceae* to *Leguminosae* before his untimely death and had also prepared all the drawings. Prof. Joshi was called in to check, revise and complete the remainder, and in a general way he has followed the plan of his predecessor. The volume is useful but it is a pity that it is rather incomplete. Not only have the *Cyperaceae* and *Gramineae* been altogether excluded (a fact that is noted but not explained in the preface), but there are other omissions. For instance, *Frankenia pulverulenta* Linn. has been collected at Lahore, yet this species and, indeed, the family *Frankeniaceae*, are omitted. Again *Carissa Carandas* Linn. is at least cultivated in Lahore (vide Parker) but is not included. These omissions emphasize the fact that it is well nigh impossible to compile a complete flora without prolonged access to a large herbarium.

The authors have only partially accepted modern developments in nomenclature and taxonomy. Thus, though the division of the old family *Leguminosae* into three has been adopted, separation of the *Aponogetonaceae* and *Potamogetonaceae* from the *Najadaceae* has been rejected.

Cocculus Leaeba DC. is retained though it has been shown that the correct name is *C. pendulus* (Forsk.) Diels, and it so appears in Gamble's "Flora of the Presidency of Madras"; *Tamarix gallica* Linn., which is cited, does not, however, occur in India, the plant going under that name in Indian Floras being a distinct species, *T. Troupii* Hole (Indian Forester, 1919); while *Melia Azadirachta* Linn. is now accepted as forming a distinct genus as *Azadirachta indica* A. Juss.

It is unfortunate that it is not always indicated whether a species listed is truly indigenous, run wild or cultivated. It should, for instance, have been stated that the three species of *Opuntia* cited are introductions which have more or less run wild. A key to the families would be a welcome addition.

With the exception of the incompleteness referred to above, these blemishes are of minor importance and are cited here only in anticipation of a revised edition.

The book starts with a synopsis of the families and ends with a glossary of botanical terms and an index of families, genera and vernacular names. Keys to the genera and species are provided

* "Lahore District Flora." By the late Professor Shiv Ram Kashyap, D.Sc., revised and completed by Amar Chand Joshi, M.Sc., with foreword by Harapresad Chaudhuri. Published by the University of Punjab, Lahore, 1936. Pp. iv+285, 218 text figs. Price Rs. 6-8-0.

and there are brief descriptions of the families and genera and many of the species. The print and style is good and neat, though rather small, and the text figures facilitate recognition of the plants depicted.

The work undoubtedly fills a want and it is to be hoped that a revised edition remedying the defects noted will soon be called for.

C. E. C. FISCHER.

Mexican Cacti.*—A great deal of work on the *Cactaceae*, mostly concerned with special areas, has been published since the appearance of the standard monograph by Britton and Rose in 1919–1923. In every case the classification has been based on that of Britton and Rose, and their descriptions and illustrations have been accepted as typifying the species concerned. The present work is no exception, but the author has endeavoured to follow the International Rules for the nomenclature, and such names as *Neomammillaria* Britt. et Rose, still adopted by some authors, are accordingly rejected in favour of those prescribed by the Rules.

The systematic treatment (pp. 71–720) closely follows that of Britton and Rose, and the keys are extracted from their work with such modifications as are required. This part is especially valuable, being based largely on studies in the field. It is illustrated by 300 figures in the text, most of which are reproduced from photographs of the plants in their native habitats. A few of these are poor, but the majority are clearer than is usual in such text-figures, and should prove of great value in the identification of species. Very few new species are included, and these are unfortunately unaccompanied by Latin diagnoses.

Nearly 700 species, representing 61 genera, are enumerated and described. Of these *Mammillaria* accounts for 203 species (13 doubtful), *Opuntia* for 100, *Coryphantha* for 51 and *Echinocereus* for 48, whilst 21 genera are represented by a single species. Of the remaining genera, only 6 exceed 10 species.

The preliminary chapters (pp. 1–70) deal with historical data, geographical distribution, general morphology, anatomy and economic value, and are illustrated by 25 text-figures. An exhaustive bibliography and index (pp. 723–755) are appended.

The book is produced on thin chalky paper, and the ink has not adhered very well in the large roman type used for the general text and descriptions, which is therefore somewhat " spidery " and difficult to read. The smaller roman type used in the keys, and the italic type used for synonyms and subheadings, are much better.

A. A. BULLOCK.

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*" Las Cactaceas de Mexico." By Helia Bravo H, Inst. Biol. Mexico, 1937. Pp. xiv + 755 + 325 figs. in the text. Price not stated.

Bibliography of Polynesian Botany.—In 1924 Dr. Merrill published a " Bibliography of Polynesian Botany " as Bulletin 13 issued by the Bernice P. Bishop Museum, Honolulu. He has now prepared a second edition*, containing approximately twice as many references and brought up to date to 1935. Notes are added under each title to give an idea of the nature of the contents and care has been taken to obtain consistency in citation and accuracy in the dating of the references. Every endeavour has been made to include all references to Polynesian plants even in general papers which deal with plants from many other countries. The region covered includes most of the islands in the Pacific Ocean but naturally excludes groups which are commonly treated as distinct geographical areas, e.g., Malaya, New Guinea and adjacent island groups, New Zealand, etc. The bibliography may be confidently recommended as providing a practically complete reference to all papers dealing with the taxonomy, phytogeography, ecology and pathology of Polynesian plants, as well as many references to such applied branches as forestry, economic botany, etc. In all some 2,600 titles are mentioned.

Indian Arboriculture.†—This volume is a revision from the pages of the " Journal of the Bombay Natural History Society " with considerable additions. Fifty-three species of trees, some of them introduced into India from other lands, are described. Thirty-one of them are illustrated by beautiful coloured plates ; in addition there are 35 full-plate photographs and 42 line drawings in the text, the latter presenting details of leaves or floral parts. The work is intended primarily for the lover of trees and flowers as such, and only secondarily for the botanist, and the descriptions are as untechnical as possible. With the book in hand, no one, however little his botanical knowledge, should have any difficulty in identifying the species mentioned.

A full description of the species is given under the English name, followed by the botanical one ; then are stated the distribution, uses and popular beliefs associated with them, ending with an exhaustive list of popular names in many languages. In most cases the derivation of the botanical name is explained. For the genera *Bombax, Cassia* and *Erythrina*, each of which is represented by several species, an easy key to assist identification has been provided. The coloured plates, which are by several artists, leave nothing to be

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* " Polynesian Botanical Bibliography, 1773–1935." By E. D. Merrill. Bernice P. Bishop Museum, Honolulu, Hawaii, Bulletin No. 144, pp. 1–194 (1937). Price $3.

† " Some Beautiful Indian Trees." By the late Rev. E. Blatter and W. S. Millard. Published by the Bombay Natural History Society. Printed by John Bale, Sons & Curnow, Ltd., London, 1937. Pp. x + 110, 31 coloured plates, many photographs and text drawings. Price 21*s*.

desired, and the whole work is excellently produced and is highly creditable to all those responsible for it.

C. E. C. FISCHER.

Leguminous Forage Plants.*—The chief object of this book, as stated in the preface, is " to enable interested persons to recognise the more important leguminous plants grown on the farm [in the British Isles], both in the seedling and in the mature stage." It is intended mainly for students at agricultural colleges and institutes, but the hope is expressed that it will be found useful by advisory officers, county organisers and others interested in farm crops. General accounts are given of over two dozen species of forage plants, with a good deal of useful information, particularly in connection with cultivation and pasture value. Two of the seven chapters in the book are devoted to the true clovers (*Trifolium* spp.). Other chapters are entitled—The Medics (*Medicago*), Other pasture plants (*Lotus, Anthyllis*), Plants grown as field crops (*Onobrychis, Lupinus, Melilotus*), Pulse crops grown for fodder (*Vicia, Pisum, Glycine*). Simple sketches of flowers, leaves, seedlings, seeds, etc., intended to assist the reader in identifying the plants, appear in the text.

As the book is intended primarily to assist in identification it is regrettable that a simple key based on morphological characters was not included. Such a key would not be difficult to prepare as the number of species is restricted and several are very distinctive. Furthermore it could have been drawn up so as to be readily usable by the ordinary reader, without assuming much previous botanical knowledge. It is doubtful whether additional technical terms to those already in the glossary would have been needed. With the book in its present form the reader with a plant to identify is obliged to go through the book page by page until he recognizes his plant. This may involve looking through the whole book and is unnecessarily cumbersome. The definitions of scientific terms in the glossary are not always clear or well chosen. The following are examples : "calyx—the green leaves at the base of a flower" : "raceme—a type of inflorescence in which the flowers are arranged spirally on an axis, each with its own stalk."

In the preface the author apologises for the use of technical terms, which he refers to as " jargon." It is unusual for those engaged in scientific work to refer to the technical terms necessary for or peculiar to their particular science in this derogatory manner.

The chemical analyses that accompany the descriptions are a useful feature of the book and a good criterion of feeding value, particularly as figures in some instances are for various stages in the plant's growth and for hay.

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* By D. H. Robinson, Ph.D., B.Sc., N.D.A., Head of the Biology Dept., Harper Adams Agricultural College, Newport, Shropshire. Edward Arnold and Co., London, 1937. Pp. 119. Price 6*s*. net.

In discussing forage lupins the writer states that the innocuous forms of recent Continental origin have not yet been tried in this country. As preliminary trials were commenced in at least one locality last year this statement requires modification. Under tares (*Vicia sativa*) mention might have been made of the possible poisonous nature of the seeds of this species if fed to stock. In recent years several cases of poisoning of live-stock, particularly pigs, have occurred through the feeding of so-called "Chilean peas" (*Vicia sativa*). Little attention appears to be paid by the writer to the importance of leguminous forage plants in honey production. In many areas white clover (*Trifolium repens*) and sainfoin (*Onobrynchis sativa*) are the mainstays of commercial honey producers. In fact white clover has been described as the world's most important honey plant, being responsible for large yields in both North American and European countries. F. N. HOWES.

Notes on Poupartia and Allied Genera.—In a paper recently published in the "Annals of Botany" on the method of germination of seeds enclosed in a stony endocarp*, the fruit structure of three species previously referred to the genus *Poupartia* Commerson (Anacardiaceae-Spondieae) was described. As that paper was largely concerned with the morphology of the fruits it seems advisable to give a separate and amplified account of the taxonomic results.

In a recent revision of *Poupartia*, Mattick† recognized 8 species, of which 5, including the type-species *P. borbonica*, come from the Mascarene Islands or Madagascar. All these 5 species are uncommon and herbarium material is scanty, but they appear to form a natural genus which is characterized by its flowers being borne singly or in small clusters on an unbranched axis and by its small 1 (– 5 ?) – locular fruits with a woody endocarp from which the radicle evidently escapes by pushing off a definite cap, which may be seen placed laterally at the apex of the fruit. In *P. gummifera* Sprague and in an unnamed specimen from Aldabra the seed is curved in the shape of a horse-shoe within the fruit which consequently in transverse section appears at first sight to be bilocular—but in *P. borbonica* Gmel. ex Poir. and *P. pubescens* (Boj.) March. ex Engl., the seed is only slightly curved. Further specimens are required before the value of these points can be ascertained.

One of the species retained in *Poupartia* by Mattick is native in Brazil, namely *P. amazonica* Ducke. It clearly belongs to a different genus for it has a big, top-shaped, 5-locular fruit (see Ann. Bot. l.c. fig. 11, n. 6). It cannot be placed in any of the American genera, but it agrees well, both in flower and in fruit, with the African genus *Antrocaryon* Pierre, to which it was accordingly transferred as *A. amazonicum* (Ducke) B. L. Burtt et A. W. Hill (Ann. Bot. l.c.

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* A. W. Hill in Annals of Botany, new series, **1**, 239 (1937).

† F. Mattick in Notizbl. Bot. Gart. u. Mus. Berlin, **12**, 678 (1935).

p. 251). The genus is now known from Uganda, Cameroons, Nigeria, Gold Coast and Brazil.

One of the two Asiatic species, *Poupartia chinensis* Merrill, is identical with *Spondias lakonensis* Pierre, which Stapf* made the type of a distinct genus, *Allospondias*. It differs from both *Poupartia* and *Spondias* in its peculiar fruit-structure (see Ann. Bot. l.c. 252, fig. 13), but agrees with the latter in having valvate petals.

The third species to be excluded from *Poupartia* is *P. axillaris* (Roxb.) King et Prain (*P. Fordii* Hemsl.), which we have made into a distinct genus *Choerospondias*. A diagnosis was given in the Annals of Botany; a description including floral characters and references are now supplied.

Choerospondias *B. L. Burtt et A. W. Hill* in Annals of Botany, new series, **1**, 254 (1937); *Spondiadi* et *Poupartiae* affinis, ab illa petalis imbricatis, putamine osseo (nec fibroso), nervo intramarginali foliolorum deficiente, ab hac floribus, foemineis solitariis vel subsolitariis, masculis et pseudohermaphroditis paniculatis, numquam in inflorescentias simplices spiciformes dispositis, fructu drupaceo putamine osseo ex endocarpio et mesocarpii parte interiore constante differt.

Arbor. *Folia* imparipinnata, foliolis 7–15 integris nervis lateralibus patulis in nervum intramarginalem haud coniunctis. *Flores* polygamo-dioici; ♂ paniculati; ♀ axillares, solitarii vel subsolitarii; pseudohermaphroditi in inflorescentias 3-pluri-floras dispositi, steriles. *Calyx* cupularis, obtuse 5-lobatus. *Petala* 5, libera, imbricata. *Stamina* 10, filamentis basi inter se et cum disco 10-lobato, lobis filamentis alternatis, coalitis. *Ovarium* superius, ovoideum, 5-loculare. *Style* 5, liberi, sublaterales, stigmatibus capitatis. *Ovula* in loculis solitaria, pendula. *Fructus* ovoideus, drupaceus, putamine osseo 5-loculari apice poris 5 membrana obtectis praedito. *Semina* intra loculos putaminis in capsulis duris, ut videtur e parietibus loculi compositis, inclusa.

Choerospondias axillaris (*Roxb.*) *B. L. Burtt et A. W. Hill*, l.c.

Spondias axillaris Roxb. Cat. Hort. Beng. 34 (1814), nomen; Fl. Indica (ed. Carey), **2**, 453 (1832), descr.; Hook. fil. Fl. Brit. Ind. **2**, 42 (1876); Gamble, Man. Ind. Timb. ed. 2, 223 (1903); King et Prain in Ann. Roy. Bot. Gard. Calcutta, **9**, pt. 1, 18, t. 25 (1906); Brandis, Ind. Trees, 201 (1906); Wilson, Veg. West. China (Publ. Arn. Arb. 2) 476 (1911); Arn. Arb. Exped. China, 1910–1911, 245 (1912); Naturalist in West. China, 172, 229 (1913); Rehder & Wilson in Sargent, Pl. Wils. **2**, 172 (1914); Hu et Chun, Icon. Pl. Sin. **1**, t. 33 (1927). *Poupartia Fordii* Hemsl. in Hook. Icon. Pl. t. 2557 (1898); Dunn et Tutcher in Kew Bull. add. ser. **10**, 69 (1912). *Poupartia axillaris* (Roxb.) King et Prain in Ann. Roy. Bot. Gard.

* Stapf in Hooker's Icones Plantarum, t. 2667 (1900).

Calcutta, **9**, pt. 1, 20 (1906) ; Mattick in Notizbl. Bot. Gart. u. Mus. Berlin, **12**, 682 (1935).

var. **pubinervis** (*Rehd. et Wils.*) *B. L. Burtt et A. W. Hill*, comb. nov. *Spondias axillaris* var. *pubinervis* Rehd. et Wils. in Sarg. Pl. Wils. **2**, 173 (1914). *Poupartia axillaris* var. *pubinervis* (Rehd. et Wils.) Mattick in Notizbl. Bot. Gart. u. Mus. Berlin, **12**, 683 (1935).

The variety differs only in the softly pubescent nerves of the lower leaf surface.

Choerospondias is now known from Sikkim, Assam, S. China (Szechwan-Kwantung) and Siam : the range is given in detail by Mattick (l.c.).

A. W. HILL and B. L. BURTT.

A Monograph on the genus Heuchera.*—This important study of a natural genus well-known in horticulture is the outcome of thirty years' consideration on the part of the senior author, who had published a synoptical revision in 1905. Fifty-one species in five sections are now recognised, an estimate lying about half-way between that of Rydberg in the North American Flora in 1905 (72 species) and that of Rosendahl himself in the same year (27 species). The introduction includes many interesting remarks on phylogeny, hybridity and the relationships of the sections. It is pointed out that the majority of the species are probably self-sterile, a fact accounting for much hybridisation in nature as well as in cultivation. This offers a reasonable explanation of the numerous wild " intergrade " forms between certain species. The authors' criteria for their taxonomic treatment of intergrading entities will be read with interest by other workers who are studying genera on similar lines. It is a pleasure to record the publication of yet another careful revision, based on field-work, herbarium study and cultural experiments, of a herbaceous North American genus.

N. Y. SANDWITH.

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* By Carl Otto Rosendahl, Frederick K. Butters and Olga Lakela. Minneapolis. The University of Minnesota Press, 1936 (Minnesota Studies in Plant Science, vol. 2). Pp. 180. Price 13*s*. 6*d*. net.

Printed under the authority of His Majesty's Stationery Office
By the South Essex Recorders, Ltd., High Road, Ilford.

(1388) Wt. 16/32 800 10/37 S.E.R. Ltd. **Gp. 381**